22 JULY, 1954 NINEPENCE

ELECTRICAL TIMES

BICC *CABLES*

for all wiring installations

publications on all types are available on request

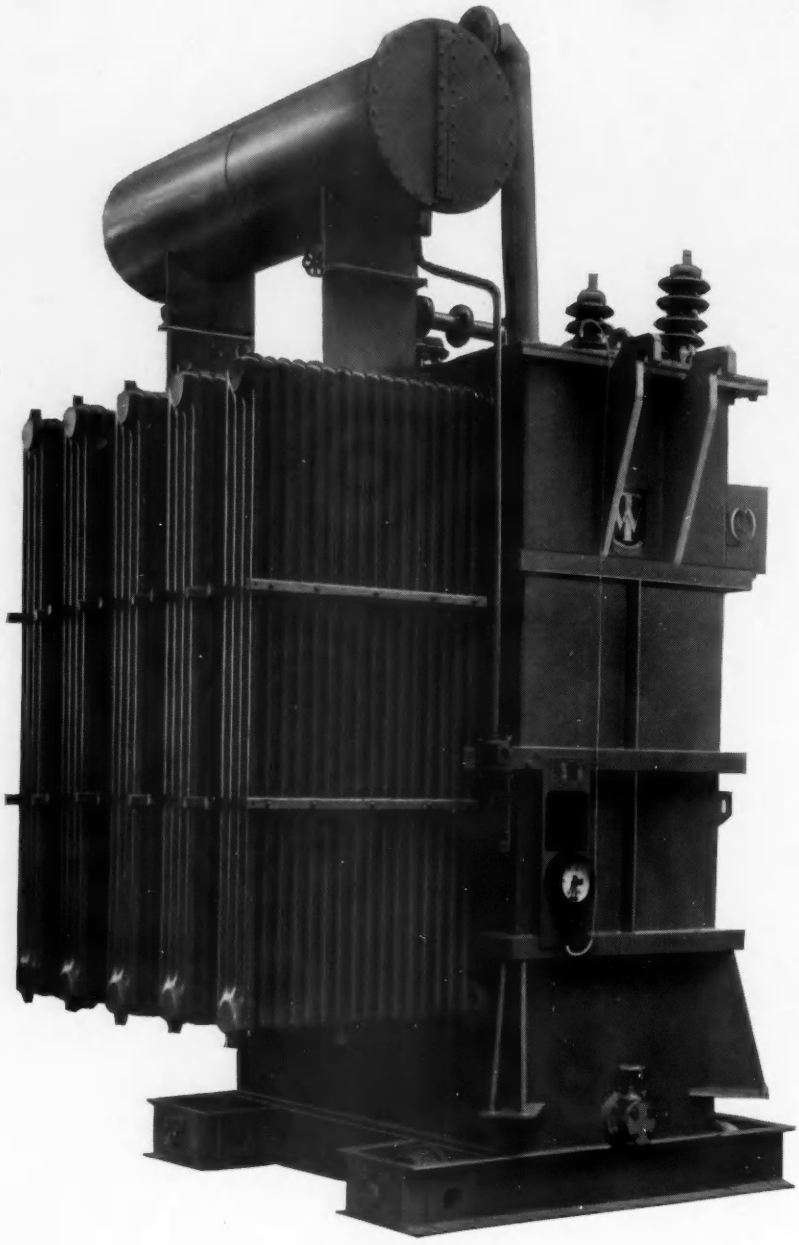
BRITISH INSULATED CALLENDER'S CABLES LIMITED
21 BLOOMSBURY STREET, LONDON, W.C.1

FOR
RELIABILITY

SOUND
DESIGN

GOOD
CRAFTSMANSHIP

IN
ALL TYPES
OF
TRANSFORMERS
UP TO
30,000 kVA



SPECIFY

TRANSFORMERS (WATFORD) LIMITED

SANDOWN ROAD - WATFORD - HERTFORDSHIRE

TW/1/54

Control board for induction and variable speed a.c. motors for the group drive of a steel strip processing line.

L.S.E. motors *deserve*

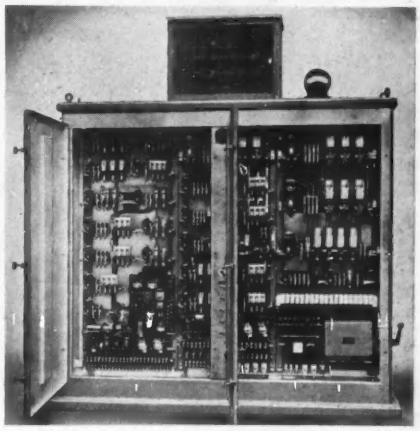
L.S.E. CONTROL GEAR

We like to supply the control gear for the motors we make, for then we know that the two will work completely in harmony. In many instances it is almost impossible to realise the full potentialities of an electric power equipment unless the motor and control gear designers collaborate from the earliest stages.

L.S.E. make a wide range of control gear, from simple direct-on starters for squirrel cage motors to complete multi-motor boards controlling numerous a.c. and d.c. machines. It is all well planned, soundly made and conveniently arranged for adjustment and maintenance.

THE RANGE OF L.S.E. CONTROL GEAR includes types for :—

Standard a.c. and d.c. motors
Variable speed machines.
Multi-motor equipments.
Marine auxiliaries, including steering gear, capstans, trawl-winches, etc.
Generators, alternators, frequency convertors, etc.



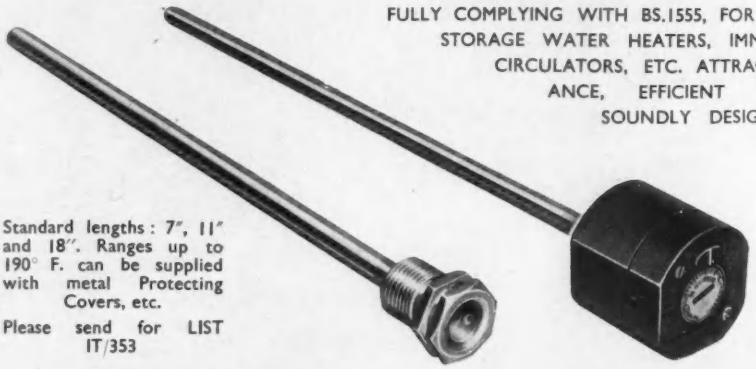
Control cubicle for main and auxiliary motors of a boring mill, with automatic table and cutting speed control.

LAURENCE, SCOTT & ELECTROMOTORS LIMITED

NORWICH, MANCHESTER, LONDON & BRANCHES

PROSCON

Domestic Immersion Thermostats *(Type NU2)*



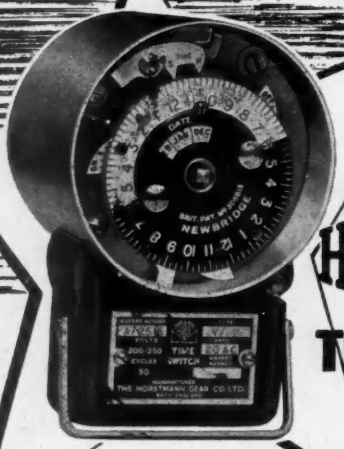
FULLY COMPLYING WITH BS.1555, FOR USE IN THERMAL STORAGE WATER HEATERS, IMMERSION HEATERS, CIRCULATORS, ETC. ATTRACTIVE IN APPEARANCE, EFFICIENT IN OPERATION, SOUNDLY DESIGNED.

Standard lengths: 7", 11" and 18". Ranges up to 190° F. can be supplied with metal Protecting Covers, etc.

Please send for LIST IT/353

PROCESS CONTROL GEAR LTD.
56 VICTORIA STREET · ST. ALBANS · HERTFORDSHIRE
TELEPHONE:- ST. ALBANS 2030 & 6689 TELEGRAMS:- PROCONGEAR, ST. ALBANS

Stars of the lighting world



HORSTMANN
TIME SWITCHES

Type "V"

The comprehensive range covers hand wound models (15, 21 & 40 day run), electrically wound models and synchronous models with or without spring reserve, as required. Models are available for public lighting, off peak tariff and shop window lighting control, etc., etc.

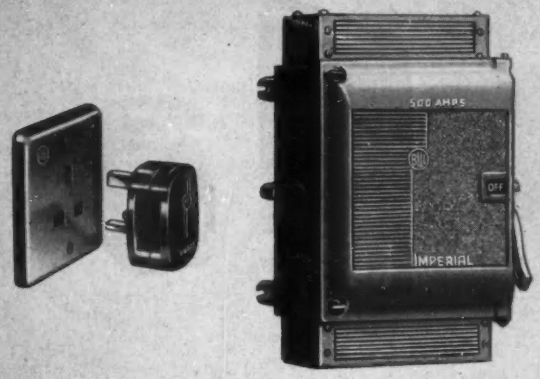
Many years of experience in the design and manufacture of automatic lighting appliances ensure that HORSTMANN TIME SWITCHES meet the exacting demands of modern lighting control.

The illustrations show the Type "V" 20 amp. and the Type "Y" 20 amp. switches. The latter is electrically wound and incorporates a spring reserve. Its compact size makes it particularly suitable for use in the base of lamp columns where space is limited.

Type "V"

THE HORSTMANN GEAR CO. LTD.
NEWBRIDGE WORKS · BATH · ENGLAND TEL: 7241

You cannot buy better gear



BILL COMPLETE RANGE
13 AMP SOCKET OUTLET TO 500 AMP FUSE SWITCH

★ SOCKET OUTLETS
★ COOKER SWITCHES
★ DISTRIBUTION BOARDS
★ SWITCHES AND SWITCH FUSES
★ INDUSTRIAL PANELS

BILL SWITCHGEAR LTD.
ASTON LANE · PERRY BARR
BIRMINGHAM·20

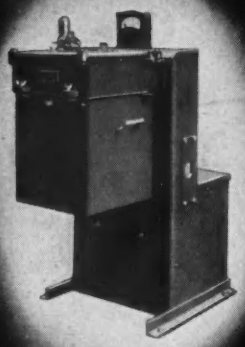
LONDON. S.W.1. A. W ZELLEY. 6a PETER ST.
MIDLANDS. G.H. GARBETT. HEAD OFFICE.
NORTH MIDLANDS. C. G. BACHELOR. HEAD OFFICE.
CHELTENHAM C. GEARING. LECKHAMPTON HILL
MANCHESTER.3. H.H.POLLARD. WOOD STREET.
BRISTOL.3. W.L.WHITE. CHURCH LANE
LEEDS.7. N. SHARPLES. 2 LOVELL RD.
GATESHEAD.8. S.J.DAVIS. 232 PRINCE CONSORT RD.
GLASGOW. J.D.HARRIS. ST VINCENT LANE

"ERSKINE HEAP"

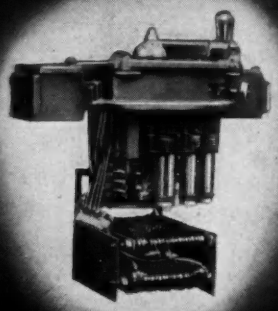
Motor Control Gear

¼ H.P. up to 5,000 H.P.

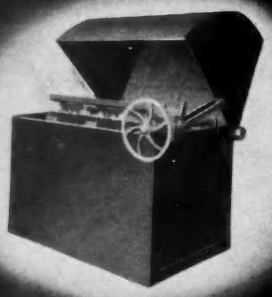
SLIP-RING AND SYNCHRONOUS MOTOR STARTERS



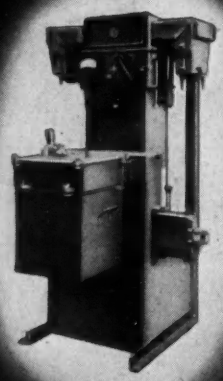
No. 2. Size Stator and Rotor Starter



No. 1 Size Stator and Rotor Starter with tank removed



Liquid Starter



3.3kV Circuit Breaker and Non-Automatic Rotor Starter assembled together as floor mounting unit

"IT'S THE GEAR ENGINEERS LIKE TO 'LIVE' WITH."

May we have your enquiries?

ERSKINE, HEAP & Co LTD

SWITCHGEAR SPECIALISTS

Head Office & Works BROUGHTON, MANCHESTER (7)

London Office GRAND BUILDINGS, TRAFALGAR SQ., W.C.2

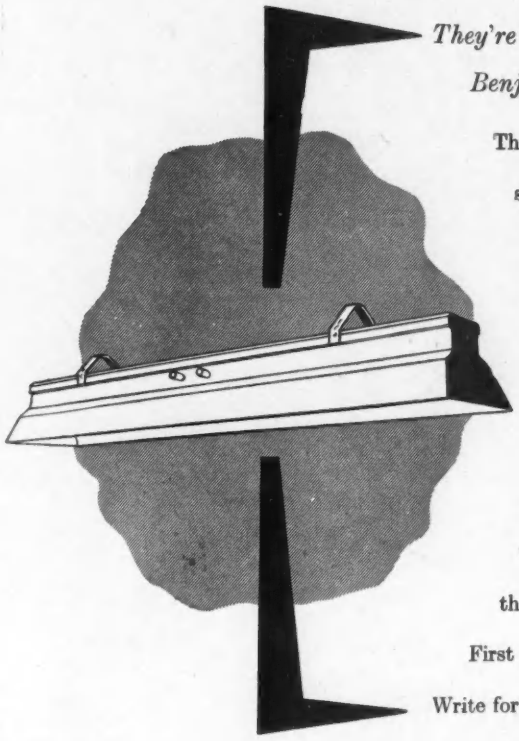
BRANCH OFFICES AND AGENCIES IN ALL PARTS OF THE WORLD

648

Benjamin introduce

PEROPAL REGD

a *NEW* finish for a *NEW* range of FLUROLIER fittings Regd.



They're here for immediate delivery! — the new Benjamin fittings!

They provide an additional line of economical Reflectors specially developed by Benjamin for light industrial requirements. A result of intensive research, 'PEROPAL' finish is undoubtedly the finest of its kind now available.

These Benjamin fittings are 'PEROPAL' finished white inside and out and are manufactured in the normal Flurolier types. They have the same channels, gear, twin tube circuits and installation facilities — only the reflectors are different.

First class lighting deserves first class advice.

Write for details and descriptive literature.

Better lighting by BENJAMIN REGD.

THE BENJAMIN ELECTRIC LTD · TOTTENHAM · LONDON · N.17

Telephone: Tottenham 5252 (5 lines) Telegrams: "Benjalect, Southtot, London"

BIRMINGHAM: 5 Corporation Street, Birmingham.2 Tel: Midland 5197. LEEDS: 49 Basinghall Street, Leeds 1. Tel: Leeds 25579

Smee's 11.54

SANTON 'OTTER'

CONTROLLED IMMERSION HEATER

The heart of an immersion heater is its thermostat and, day-in day-out, tens of thousands of Santon 'Otter' Immersion Heaters are proving that 'Otter' Control is 100% reliable.

And so they should be—for they are tested to over 750,000 operations without breakdown.

ADVANTAGES OF 'OTTER' CONTROL

- Heavy gauge spun aluminium case—instrument pre-set and sealed against dust or tampering. Easily fitted or removed without breaking water joints.
- Robust non-tracking moulded panel allowing clearances and tracking paths far in excess of normal.
- Self-cleaning heavy solid silver contacts with speed of break far in excess of normal.
- Breaking motive force 8 times normal, eliminating sticking or welding of contacts.
- Contacts are forced together to produce break therefore highest pressure at point of break—contact bounce practically nil.

SANTON

SANTON LIMITED · NEWPORT · MON

Telephone 71711

LONDON (Shepherds Bush 3311) MANCHESTER (Central 1394/5) LEEDS (59361) BIRMINGHAM (Midland 6421) Newton Abbot 1638

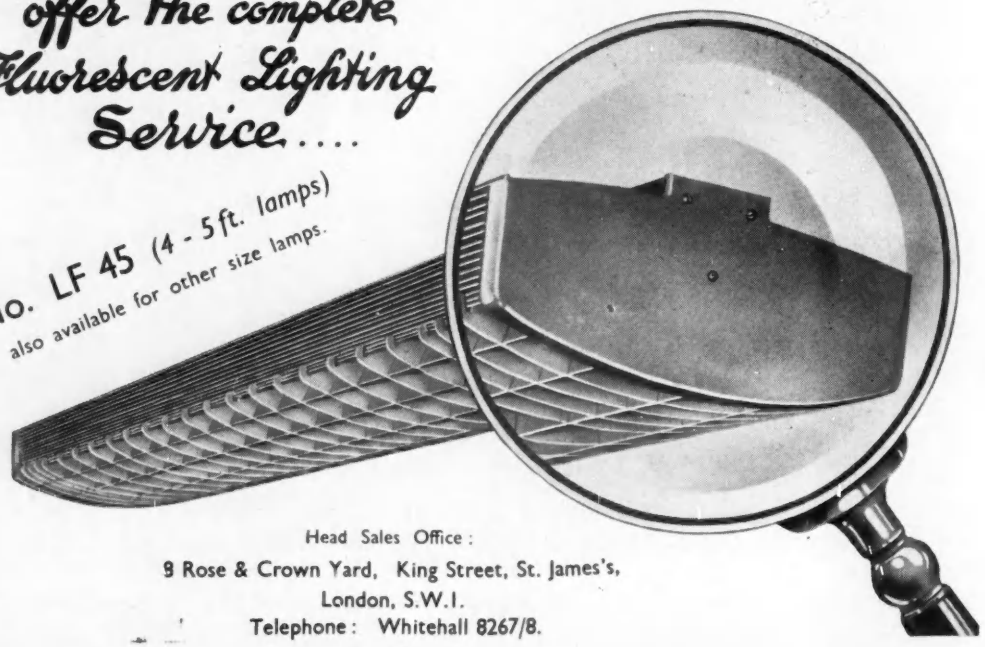
SB

SMART & BROWN (ENGINEERS) LIMITED

FLUORESCENT LIGHTING

Smart & Brown offer the complete Fluorescent Lighting Service....

No. LF 45 (4 - 5 ft. lamps)
also available for other size lamps.



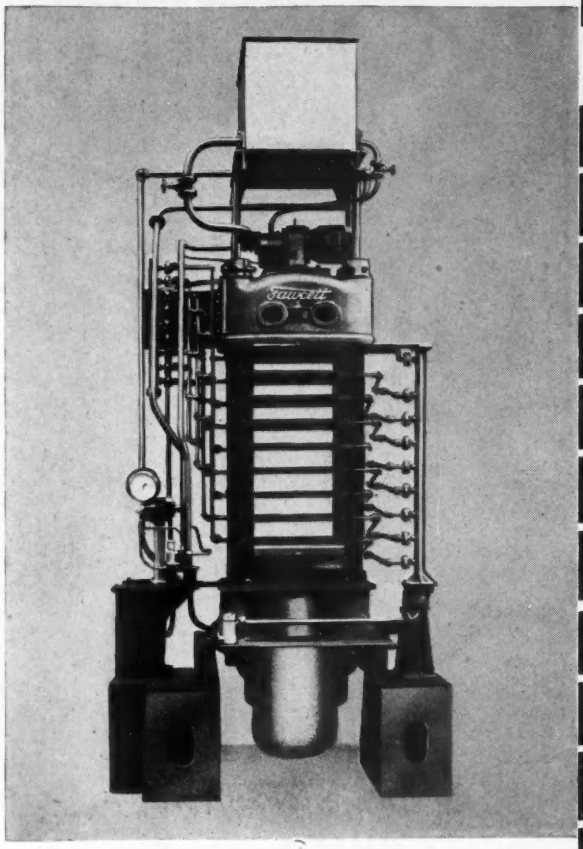
Head Sales Office:
9 Rose & Crown Yard, King Street, St. James's,
London, S.W.1.
Telephone: Whitehall 8267/8.

ZFG4

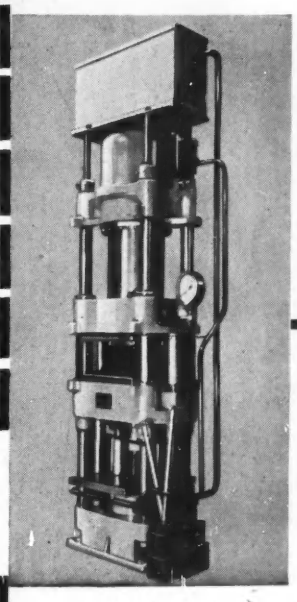
have you a pressing problem?

Then a hydraulic press from our wide range will probably solve it. If, however, it is a very unusual problem, Fawcett designers will gladly co-operate to produce a machine that will economically, yet efficiently, overcome it. For nearly two hundred years we have served industry in a whole-hearted attempt to cut production costs and increase efficiency. Methods change, new materials are developed, but the Company of Fawcett, Preston is always in step.

Fawcett EST 1758 HYDRAULIC PRESSES



This 500-ton up-stroking multi-platen Press has a self-contained pump and oil reservoir mounted on top. Platens are arranged for alternate steam heating and water cooling.



A typical Fawcett hydraulically operated, down-stroking, 100-ton plastic moulding press.

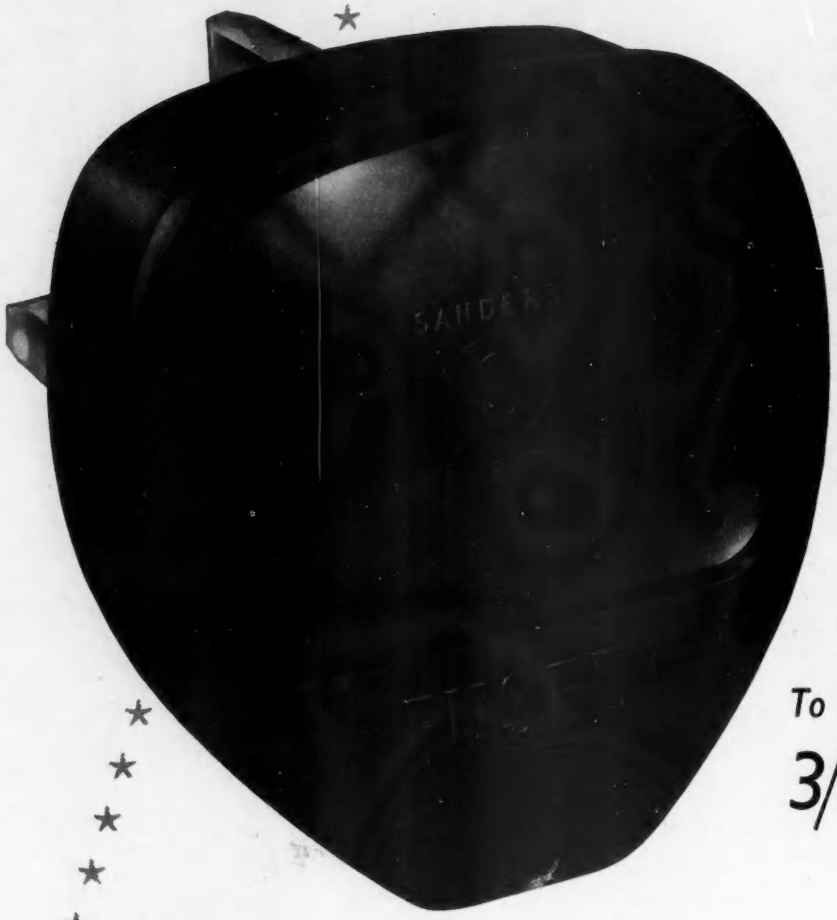
Special presses designed to suit individual requirements

FAWCETT, PRESTON & CO LTD BROMBOROUGH, CHESHIRE PHONE: ROCKFERRY 2201 (5 LINES)

P 4623

Now!

A 13 Amp. Fused Plug



To retail at
3/8 each.

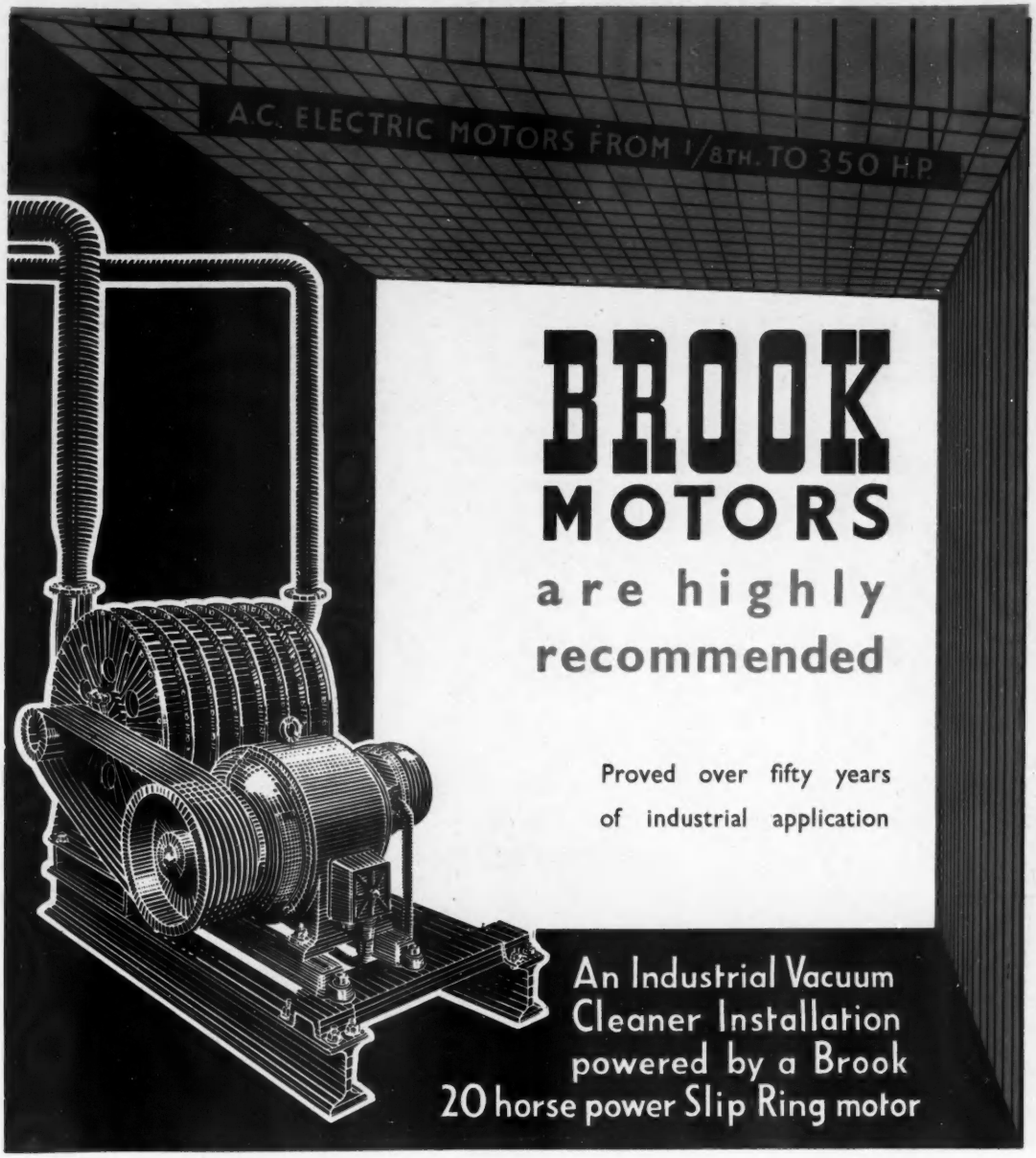
in Resilient Rubber . . . by

SANDERS
WEDNESBURY

Makers of unbreakable Plugs since 1937

LEAFLET 152
GIVING FULL DETAILS ON REQUEST

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.



"In the plant installations we have been carrying out, we have recommended and installed your motors as we have every confidence in them."

A recommendation from a leading electrical contractor.

BROOK MOTORS LIMITED
HUDDERSFIELD • ENGLAND

1904·FIFTY YEARS OF ELECTRIC MOTOR MAKING·1954

I.MY.298

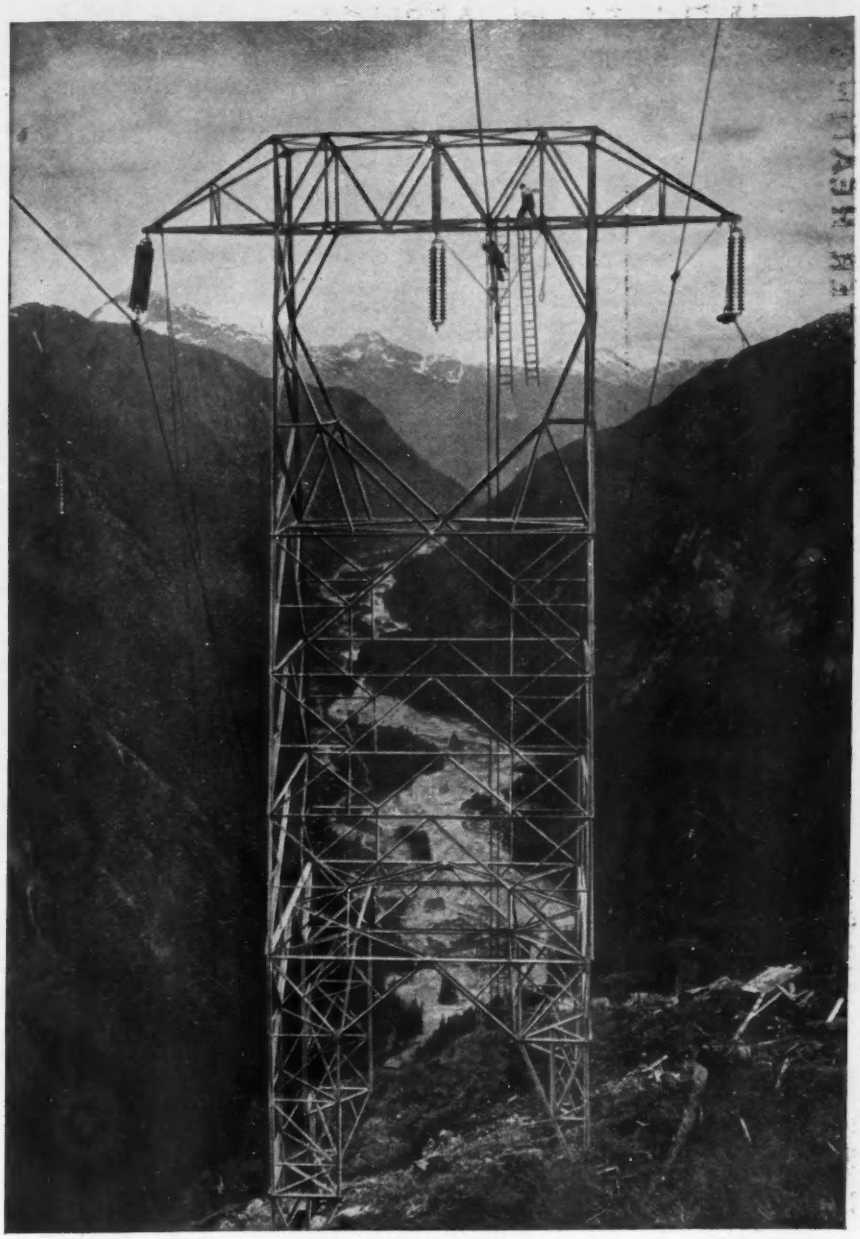
WESTALITE

METAL RECTIFIERS

By connecting a 'Westalite' rectifier of the required output between the AC supply and existing DC equipment, no other adjustment is necessary and operations go on as usual. Westinghouse 'Westalite' Rectifiers make the changeover from DC to AC mains as simple as that. The illustration above (by courtesy of Messrs. W. J. Hubbard & Sons Ltd.) is an example of such an installation, and is one of many carried out by the London Electricity Board in the South East Area of London. Extensive ranges of single- or three-phase rectifiers for all industrial applications such as battery charging, DC motor drives, magnet excitations, etc., are now available EX STOCK.
Write for full details to

WESTINGHOUSE BRAKE & SIGNAL CO. LTD
DEPT. E.T.13 82 YORK WAY, KING'S CROSS, LONDON, N.1

aluminium adventure



power climbs over A PASS

High above the steep sides of the Kemano valley, British Columbia, engineers handle aluminium cable, steel reinforced, 2.26 ins. in diameter — the largest ever made.

This unique transmission line, designed to withstand heavy icing loads, will carry the 300,000 volt output of the Kemano underground power station across fifty miles of rugged terrain and over the 5,300 ft. Kildala Pass. To mountain sites inaccessible to all other forms of transport, helicopters have flown-in materials and equipment for the transmission towers which will take the power over the pass to Kitimat.

There, on the shores of the Douglas Channel, the great new smelter of Aluminum Company of Canada Ltd. is rapidly taking shape. When fully developed it will be capable of producing 500,000 metric tons of aluminium a year, and will play an important part in making aluminium and its alloys ever more abundantly useful.

Aluminium Union Limited

(Incorporated in Canada)

THE ADELPHI, STRAND, LONDON, W.C.2 AN ALUMINIUM LIMITED COMPANY
PRINCIPAL BRITISH COMMONWEALTH DISTRIBUTOR OF ALUMINIUM

Backer

TUBULAR SHEATHED HEATING ELEMENTS

are suitable for the majority of heating problems

Cartridge Heating Elements

have you a heating problem? Let us help you solve it!

one of many applications

BACKER ELECTRIC COMPANY LIMITED
FITZWILLIAM ROAD ROTHERHAM YORKS

FAIR PLAY

SWITCH BLOCKS
built of* KILN DRIED *timber
STAY FLAT
AND CORRECT SHAPE

We invite your enquiries

WOOTTON & CO. LTD.
ALMA WORKS, PONDERS END
MIDDLESEX
TELEPHONE: HOWARD 1858

Write for leaflet G13015

B T-H

BRITISH STANDARD DIMENSION MOTORS

British Thomson-Houston were among the first to manufacture mechanically-interchangeable motors conforming to B.S. 2083. Other makers build to this spec., but the BTH range of totally-enclosed fan-cooled squirrel-cage motors up to 20 h.p. have mechanical and electrical characteristics that are unsurpassed.

AVAILABLE FROM STOCK

THE **BRITISH THOMSON-HOUSTON** CO. LTD. · RUGBY · ENGLAND

Member of the AEI group of companies

A4800

Outdoor IVIO 150 MVA 11 kV substation controlling supplies to newly developed Industrial estates.

Rear pillars house tripping batteries, inter-substation telephones and relays.

UNFAILING SERVICE —SUMMER OR WINTER

Standard ring main substation as adopted by one of our large users of IVIO outdoor switchgear.

Write for Catalogue M.C. 6/1

YORKSHIRE SWITCHGEAR

& ENG. CO. LTD.

LEEDS ——————— LONDON

Associated with Electro Mechanical Mfg. Co. Ltd., Scarborough

Ediswan Lampholders incorporate these five special features for trouble-free service

- **The metal liner is firmly keyed top and bottom to the plastic outer and cannot work loose**
- **Because the metal lines the full depth of the plastic, expansion and contraction are limited, making the plastic less subject to cracking**
- **The solid plungers are loaded with rustproof steel springs**
- **Terminals are prevented from rotating thus permitting easy straight-through insertion of lead every time**
- **Cord is firmly gripped and there are no sharp edges to cause wear**

Details and prices on request. Order from your nearest Ediswan branch

EDISWAN

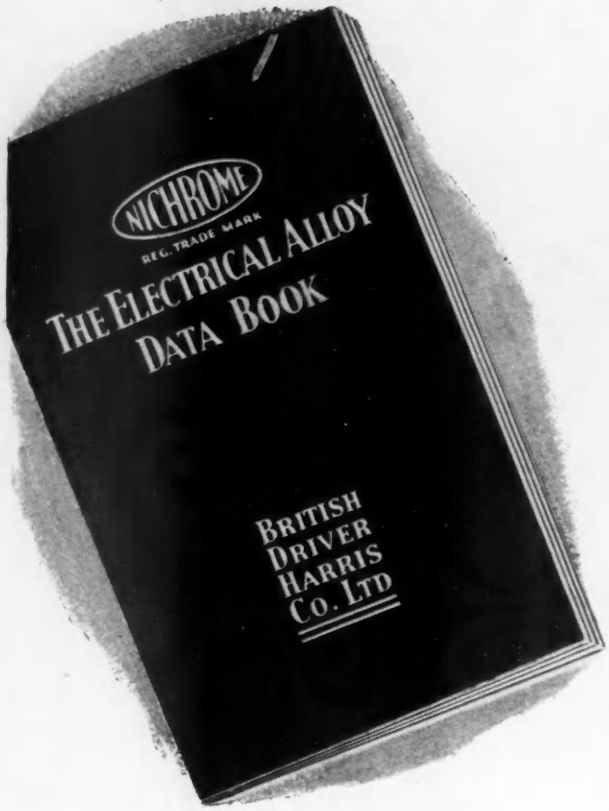
LAMPHOLDERS

THE EDISON SWAN ELECTRIC COMPANY LIMITED

155 Charing Cross Road, London, W.C.2 and branches

Member of the A.E.I. Group of Companies

E36



The book of technical data

The design and performance of electrical equipment, in both heating and resistance applications, depend largely upon the correct use of various alloys which may have widely differing properties. Information about these alloys is, we suggest, fundamental to manufacturers of electrical equipment, and this is conveniently available in detailed form in our technical data book, a copy of which may be had on application.

BRITISH DRIVER-HARRIS CO. LTD

MANCHESTER 15

THE GREATEST NAME IN ELECTRICAL RESISTANCE

Nickel and Nickel Alloy Specialists:—for furnace elements, domestic appliances, thermo-couples, telecommunications, lamps, spark plugs, fine wires, etc.

"NICHROME"
REGISTERED TRADE MARK

VERSCO

wash boilers
new editions of
a famous range

VERSCO SQUARE BOILER

VERSCO ROUND BOILER

VERSCO SQUARE DE LUXE BOILER. This smart and compact boiler is fitted with castors for easy movement and is finished in cream stove enamel. The table-top in cream vitreous is an attractive feature.

VERSCO ROUND BOILER. Obtainable in Galvanised finish as shown (a most durable finish of special appeal for Corporation and other housing schemes) or in cream stove enamel.

THESE FEATURES ARE COMMON TO ALL VERSCO MODELS: Heavily tinned 10 GALLON copper container —Double pole 3 heat rotary switches A.C. or D.C. (safety cut-out available if required)—Chromium plated taps with heat-resisting handles—Six 500 W clamp-on elements give maximum loading of 3 Kw.—Top surrounds in die-cast aluminium and pressed aluminium loose lids for easy access.

Send for new leaflet giving full specifications and prices.

SWIRLUX WASHING MACHINES

500H MODEL heats the water, 6 lb. dry weight capacity, 12" wringer which folds down when not in use. Exclusive Swirlux agitator. (Unheated version 500 MODEL also available.)

503 MODEL— 10/11 lb. dry weight capacity, full size power wringer with five working positions. Exclusive Swirlux agitator. Power pump and hose for quick emptying. For full details send for Swirlux Leaflets.

Universal Boilers & Engineering Co. Ltd., Fulledge Works, Burnley, Lancs.
TELEPHONE: 3121 and 3203

Photo by courtesy of THE BARNHALL DANCE CENTRE

★

Another **THERMODARE** *installation*

★

over 35,000 now in use

★

INEXPENSIVE OUTLAY
ECONOMIC RUNNING

★

"OFF-PEAK" storage units completely assembled, ready for connection

★

3 MODELS — TAX FREE
5 year guarantee

THERMODARE TECHNICAL SERVICE

Our Technical Service will be pleased to discuss your heating problems, and offer you our specialised experience of 7 years' practical application of thermal storage unit heating.

THERMODARE (GREAT BRITAIN)

79/80, PETTY FRANCE, LONDON, S.W.1

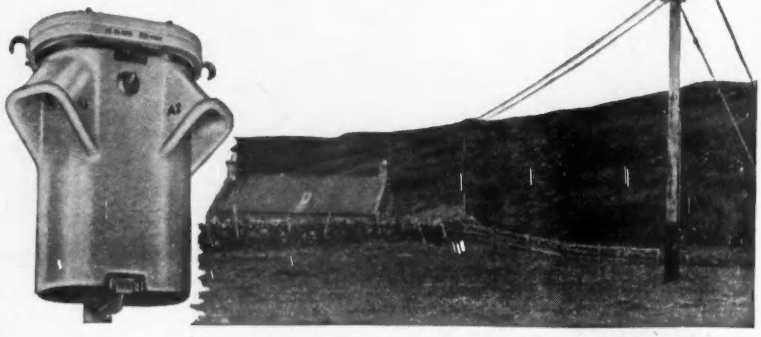
Telephone: ABBey 1060/3348

and at 700, ARGYLE STREET, GLASGOW, C.3 *'Phone: CITy 7715/7*

British Power Transformers

for rural distribution

in hermetically-sealed stoneware containers



Photograph by courtesy of British Insulated Callender's Construction Co. Ltd. and the North of Scotland Hydro-Electric Board.

- No maintenance costs. Containers are salt and acid proof. Supporting steel work is heavily galvanised. Hermetically sealed container protects oil from acidity.
- Increased efficiency and reduced operating costs due to low losses.
- High Overload Capacity.
- Simple installation—only one or two bolts required. Other types of distribution transformers, including units to the Draft National Standard Specification T.1. in steel tanks, can also be supplied.

BRITISH POWER

BRITISH POWER TRANSFORMER CO. LTD.

Telephone: HOWard 1492 QUEENSWAY, PONDERS END, MIDDLESEX *Telegrams: Vitrohm Enfield*

BP/3112/AH

The standard of quality and performance the world over

All listed Fuse Links available ex stock

'ENGLISH ELECTRIC'

h.r.c. fuse links

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Fusegear Works, East Lancashire Road, Liverpool 10

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

F.9

Precision-built to Perfection

The "Megger" Insulation Tester, Series 2, is available in various ranges and testing pressures up to 2,000 megohms at 1,000 volts. Ideal for testing power circuits, motors and industrial and domestic apparatus of all kinds.

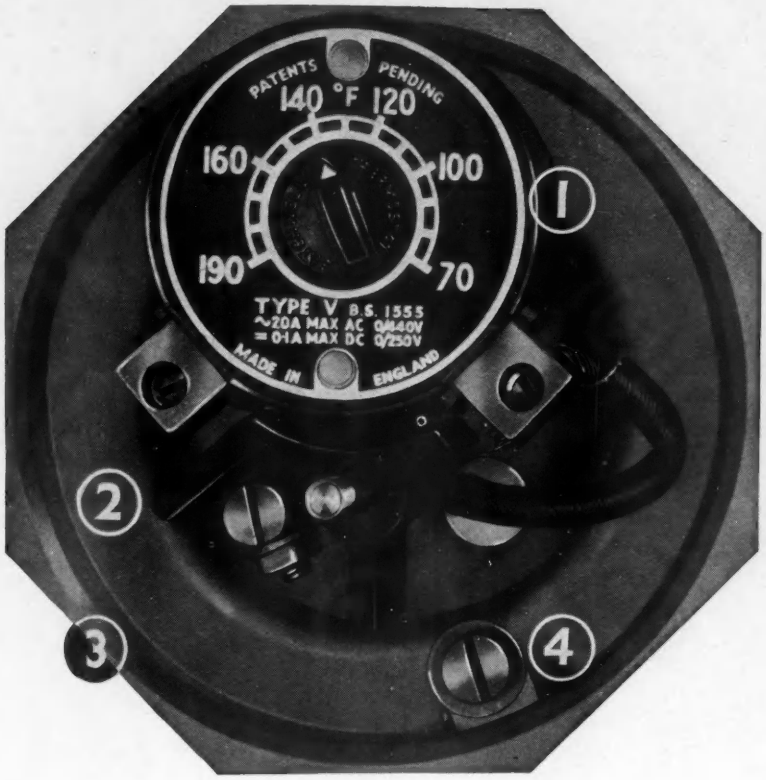
Please write for fully illustrated brochure J. 236

MEGGER
TRADE MARK

EVERSHED AND VIGNOLES LIMITED
ACTON LANE WORKS · CHISWICK · LONDON · W.4

Telephone: Chiswick 3670 · *Cables: Megger, London* · *Telegrams: Megger, Chisk, London*

6/123



WIRING MADE EASY . . .

The G.E.C. now have a new range of Immersion Heaters with these easy-to-wire features:

1. Thermostat cannot rotate in head.
2. Phase and neutral wires separated by barrier.
3. Shortest possible wire route inside head.
4. Bare earth wires can enter via slot in cover.

The sizes available range from 12in. to 30in. suitable for either vertical or horizontal mounting. Prices from 47/3 (Purchase Tax 17/3 extra) for the 3kw. 12in. model. Thermostat 28/10 extra.

New G.E.C. IMMERSION HEATER

The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.

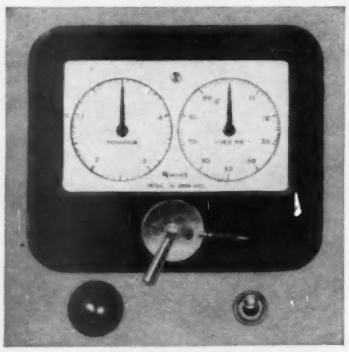
FERRANTI

HIGH SPEED TESTING EQUIPMENT

for A.C. singlephase meters

The test bench carries two rows of twenty meters, the upper row warming prior to testing, whilst the lower row is being calibrated.

Conversion equipment supplied separately for modernising existing conventional test equipment.



One of the slave sub-standard counters which are mounted on a panel below the meters on test.

A completely self-contained unit for installation in new testing stations for expediting meter adjustments and calibration to close limits. Meters are stroboscopically tested on high loads and by timing from the counters on low loads.

Write for list M.54 which contains full particulars.

FERRANTI

FERRANTI LTD · HOLLINWOOD · LANCS

LONDON OFFICE: KERN HOUSE, 36 KINGSWAY, W.C.2

FM 110

This leaflet should be on your files...

It describes the Brush self-regulating alternators which offer you better performance at lower overall costs on these main counts:—

★ No automatic voltage regulator needed

★ Voltage regulation 2½ per cent for all conditions of loading, temperature and power factor

★ Very rapid response with change of load

★ Parallel operation with similar machines or conventional alternators

★ Heavy load surges taken with minimum transient voltage change

★ Control between 50 and 60 cycles over normal voltage range

Write for Publication No. 21063

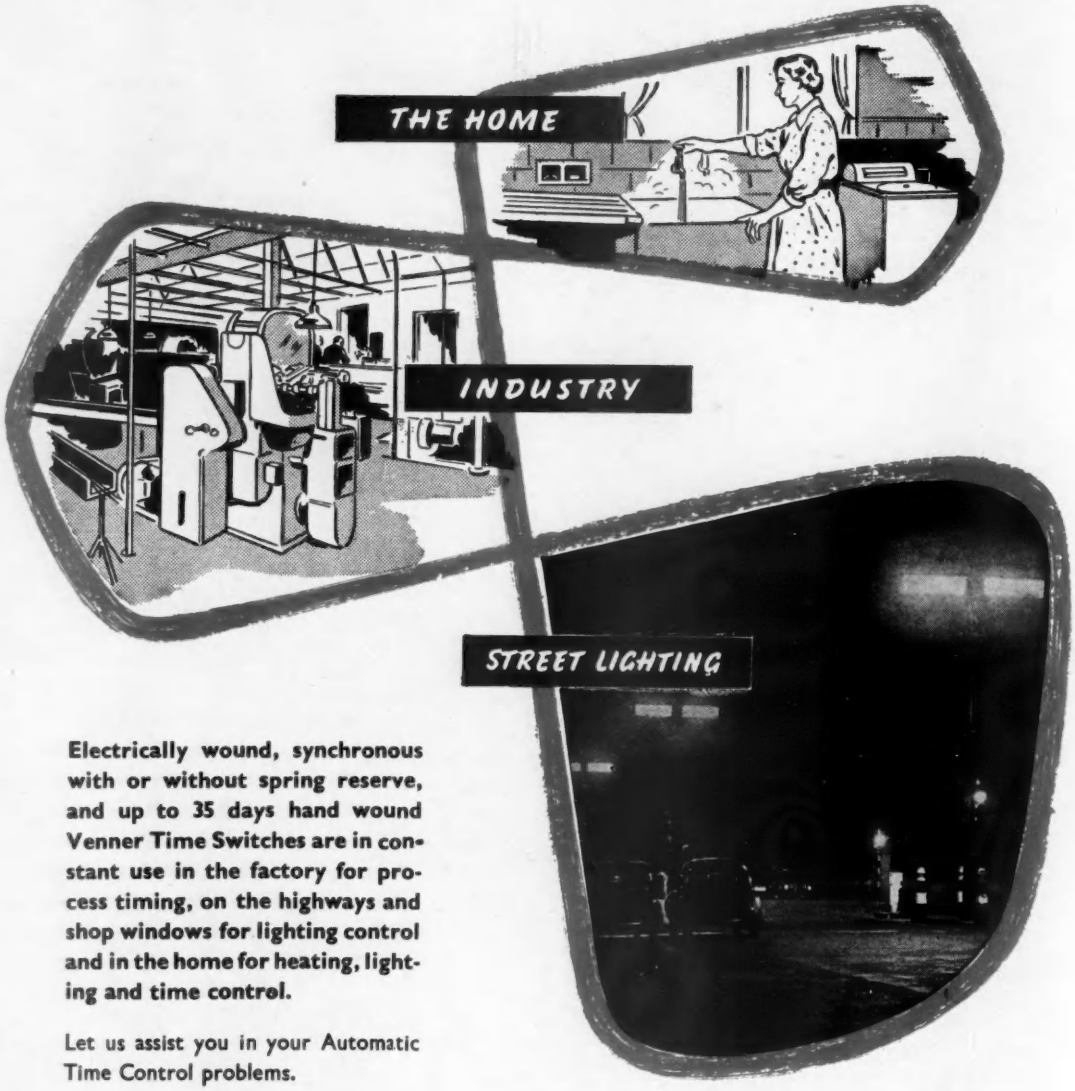
BRUSH

BRUSH ELECTRICAL ENGINEERING CO. LTD • LOUGHBOROUGH, ENGLAND

BIRMINGHAM · BRISTOL · CARDIFF · GLASGOW · IPSWICH · LEEDS · LONDON · MANCHESTER · NEWCASTLE · SHEFFIELD

B.37

Automatic Time Control



Electrically wound, synchronous with or without spring reserve, and up to 35 days hand wound Venner Time Switches are in constant use in the factory for process timing, on the highways and shop windows for lighting control and in the home for heating, lighting and time control.

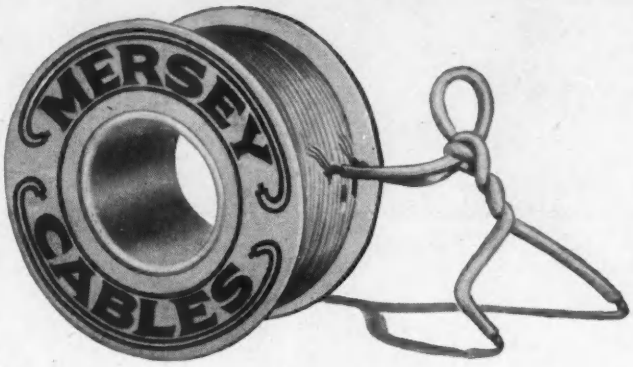
Let us assist you in your Automatic Time Control problems.

Leaflet ER/1 sent on request.

Always use **VENNER**

VENNER LIMITED KINGSTON BY-PASS, NEW MALDEN, SURREY. Tel.: MALden 2442

Associated Companies: Venner Accumulators Ltd. Venner Electronics Ltd.



THE MARK OF QUALITY

for

RUBBER AND THERMOPLASTIC INSULATED WIRES, CABLES AND FLEXIBLES

MERSEY CABLE WORKS LIMITED

LINACRE LANE · BOOTLE · LIVERPOOL, 20

Telephone: BOOTLE 4111 (4 lines)

Telegrams: MERCABLES LIVERPOOL, 20

A TI COMPANY

C

NEW DAY

MODERN ELECTRICAL ACCESSORIES

Pilot Control Switches

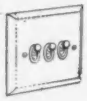
Available for flush or surface mounting with fused or unfused pilot lamp circuit. 20 amp D.P. AC main only. Brown or Ivory.

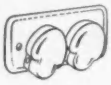
Specially recommended by leading manufacturers of immersion heaters.

FROM 16/- EACH LIST, LESS LAMP

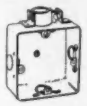
OTHER NEW DAY ELECTRICAL ACCESSORIES INCLUDE:

FIRESIDE TRIPLE SOCKETS


TUMBLER SWITCHES


TWIN TWO SOCKETS

13 AMP SOCKET OUTLETS


CONDUIT BOXES

Attractive reliable accessories at competitive prices. Send for catalogue.

NEW DAY ELECTRICAL ACCESSORIES LTD, 136-8 MARY ST, BIRMINGHAM 12. Phone: Calthorpe 2621

A subsidiary of Southern Areas Electric Corporation Limited.

AND NOW

- PRE-PACKAGING TO ALL
- MINISTRY (A.I.D., I.F.V. ETC.)
- REQUIREMENTS

'This is in addition to our well established commercial packing and case-making business. DELIVERIES ARE GUARANTEED.'

Enquiries to

STANHOPE BOX Co., LTD.

HUNTON BRIDGE WHARF, KINGS LANGLEY, HERTS.

Kings Langley 2361, 2373

and at

RECTORY SQ., LONDON, E.1

Stepney 3752

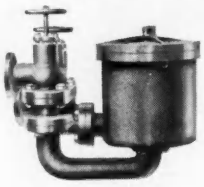
75-77 FAIRFIELD ROAD, BOW, LONDON, E.3

Advance 1227-8

Dirty Water

causes damage

Remove suspended impurities from your boiler feed water—with a . . .



Crockatt

FEED WATER FILTER

W. CROCKATT & Sons Ltd.

DARNLEY STREET, GLASGOW, S.1

EVERETT EDGCUMBE INSTRUMENTS IN SERVICE

The desk panel illustrated below is fitted with Everett Edgcumbe instruments of the 4″ square flush pattern in metal cases with toughened glass fronts. They were specially designed to withstand the arduous conditions of service met in steel works and similar situations.

EVERETT EDGCUMBE SQUARE INSTRUMENTS

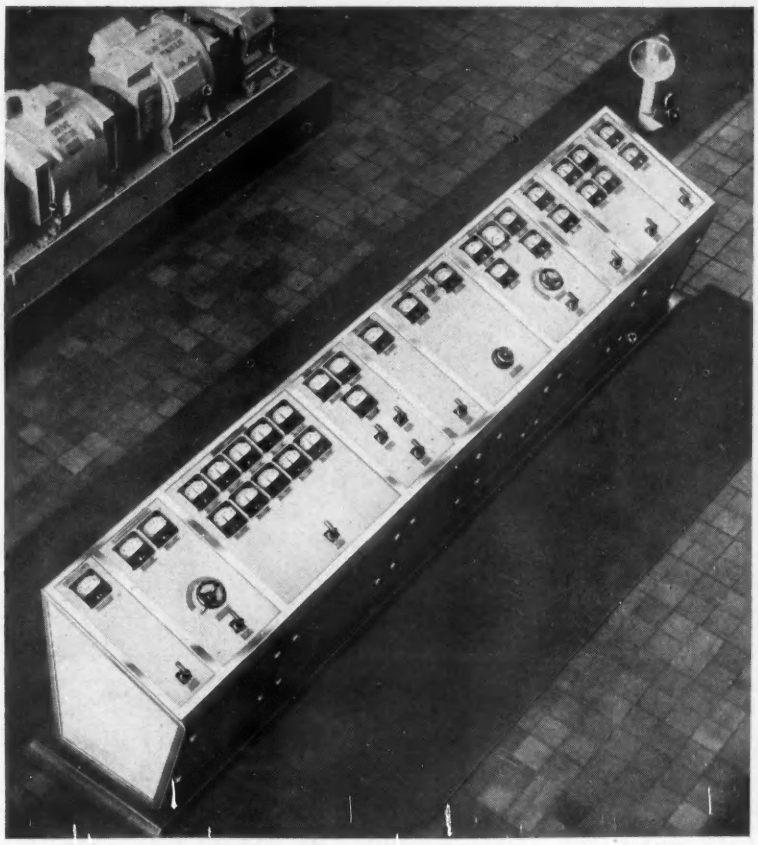
Designed for modern panels.

Sizes : 3¼″ semi-flush.
4″ flush or projecting.
6″ flush.

Insulated or metal cases.
Clean, well-balanced appearance.
Smooth front without decoration.
Rounded corners and edges.
Maximum readability.
Minimum panel space.
Easy fixing.

Ammeter . Wattmeter . Power Factor Meter . Voltmeter . VAR Meter . Synchroscope . Frequency Meter . Electric Clock.

for all systems and frequencies balanced and unbalanced loads.



EVERETT EDGCUMBE

Designers and manufacturers of almost every type of electrical indicating and recording instrument.
Specialists in : Speed Recording, Photometry, Process Time Control, Telemetering.

COLINDALE WORKS LONDON N.W. 9. TELEPHONE: COLINDALE 6045

R77

The Art
OF J. & P. ALUMINIUM SHEATHED WIRING CABLES
is Functional

Not only do they look as pretty as a picture, but they have many very practical advantages. They combine strength with remarkable light weight; they are completely free from condensation troubles; they need no precautions against moisture during installation; and one simple gland is used to enter them into standard conduit boxes with no cutting and screwing of threads or pulling-in of cable.

British Patent Nos. 627815 & 627793.

Photograph taken in the switchroom of the B.E.A.'s Carmarthen Bay Generating Station. Contractors: Messrs. R. Alger & Sons Ltd. Newport, Mon.

JOHNSON & PHILLIPS LTD.

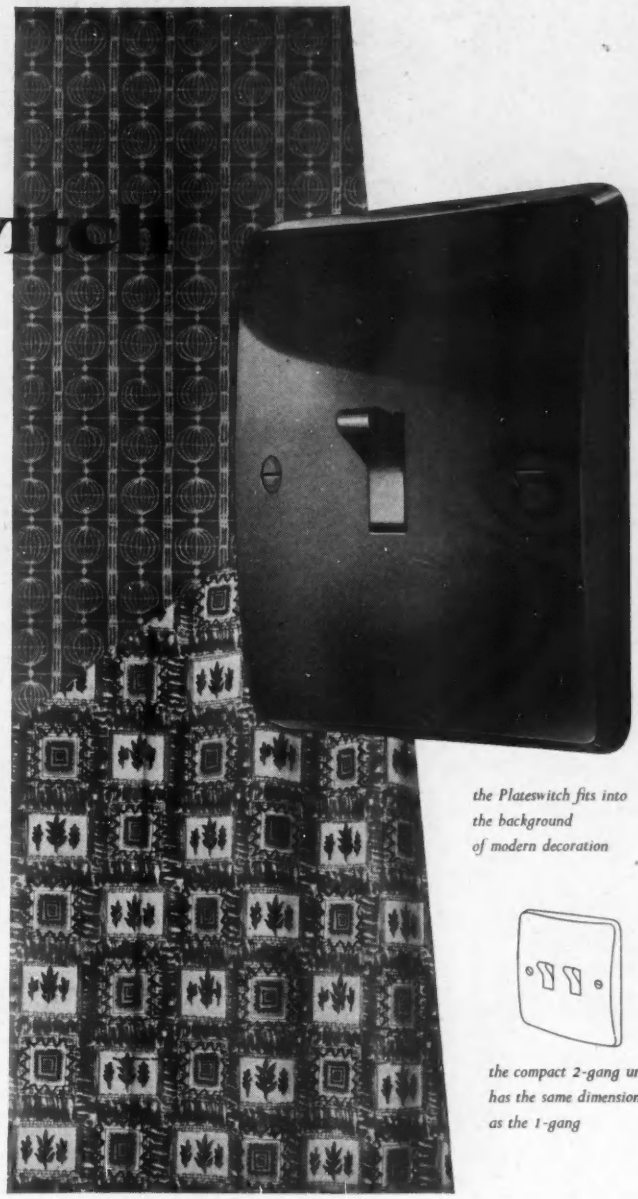
CHARLTON • LONDON • S.E.7

ELECTRICAL ENGINEERS & CABLE MAKERS SINCE 1875

LIK97DHB

A distinctive new design combining all the features you have asked for

the **Plateswitch**



the Plateswitch fits into the background of modern decoration

the compact 2-gang unit has the same dimensions as the 1-gang

INSTALLATION is simpler . . . speedier. Both one and two gang switches have 2⅜" fixing centres. The fixed plate ensures automatic levelling with the plaster. A range of boxes gives a choice of cable and conduit entries.

THE ACTION is positive, yet can be controlled in silence. Contacts are balanced for maximum pressure with minimum stress, giving trouble-free performance and long life. The movement is factory-sealed and requires no maintenance.

THE COST is remarkably low — right in line for the most competitive housing work. For example, the ivory **Plateswitch** costs less than you usually pay for brown.

THESE FEATURES SIMPLIFY STOCKING

Every **Plateswitch** is supplied with four screws to match — two 4BA for metal boxes and two No. 5 wood screws for wood boxes.

The two gang **Plateswitch** has two 2-way switches only, each or both of which can be wired as 1-way.

Leaflet 227 illustrates the range in full colour.

MK ...the mark of leadership

M.K. Electric Limited, Wakefield Street, Edmonton, London N.18. Edmonton 5151

Was this YOUR fault?

Don't take chances - choose METROVICK protection

A little trouble on protecting heavy duty generating equipment goes a very long way. Sensitive Metrovick relays respond at the first signs of irregularity, protecting the plant from serious damage and ultimate failure. The technical service offered by Metrovick engineers on problems of electrical plant protection remains unsurpassed.

Metrovick relays for generator protection.

Longitudinal differential
Transverse differential
Time graded overcurrent and/or earth fault
Instantaneous restricted earth fault
Phase unbalance
Over-voltage
Field failure
Rotor earth-fault, etc.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

Member of the AEI group of companies

Safeguarding Electrical Equipment

G/A409

Built to YOUR OWN requirements . . .

Special control panels can be built to suit customers' installations, these panels can be of the open type having air break switchgear mounted on angle iron frames, suitable for wall or floor mounting, or alternatively, the enclosed type having air break switchgear mounted on the surface of a cubicle panel as shown in the illustration.

REVO
REGD.

SWITCH & FUSE GEAR

For close on half a century switchgear has formed one of the main products of the Revo Electric Co. Ltd., and the resources of this large modern self-contained organisation enables the company to offer equipment, at competitive prices, second to none in quality and design.

The range includes light and heavy duty switches and switchfuses, iron-clad and wood-cased fuseboards, consumer's service units, etc. A section of the Revo Switchgear Department is also equipped for the production of special large control panels (detailed above) and the company will be pleased to submit tenders and layouts for this class of work.

REVO ELECTRIC CO. LIMITED, TIPTON, STAFFS. TELEPHONE: TIPTON 1891 TELEGRAMS: REVO, TIPTON

Branches at: LONDON, MANCHESTER, CARDIFF, GLASGOW, LEEDS, NEWCASTLE-ON-TYNE, BELFAST, DUBLIN

Manufacturers of Electric Cookers, Domestic Appliances, Public & Industrial Lighting Equipment, Switch & Fusegear, Electric Fans

MOULDED BAYONET HOLDERS

by Sperryn TRADE MARK

A complete range of Batten, C.T.S., Skirted, Conduit, Switch and Flexible lampholders are available complying with B.S.52

for Efficient Electrical Accessories of Quality

"Specify Sperryn"

SPERRYN & CO. LTD., MOORSOM STREET, BIRMINGHAM 6

LONDON OFFICE:
23 GREAT SUFFOLK STREET, S.E.1

Amalgam RESINACT—
A supremely efficient new solder

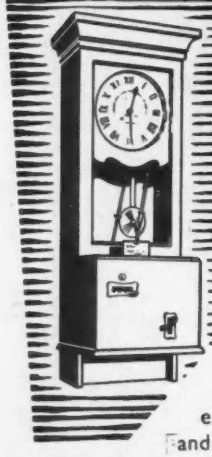
FREE testing sample. Write to us for a sample of this new, A.I.D. approved, activated solder wire with non-corrosive RESINACT core. It is specially designed for all electrical work and is available to any specification in sizes from 4-22 W.G. We are specialists in all forms of fusible alloys.

GREY & MARTEN LTD.
ESTABLISHED 1833
CITY LEAD WORKS · SOUTHWARK BRIDGE · S.E.1
Telephone: HOP 0414 Telegrams: Amalgam, Sedist, London
and at Birmingham and Ipswich

---

m·e·a·s·u·r·e·d

TIME

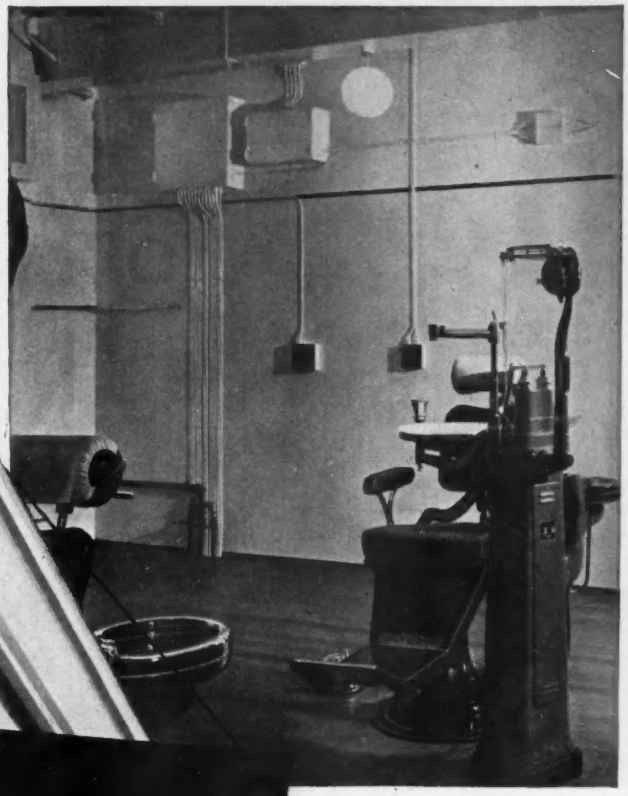


There is a GLEDHILL-BROOK RECORDER for every period of attendance and occupational operation—an accurate mechanical system which times the job as well as the man on the job—a legible, indispensable record ensuring a square deal for employer and employed. *The demand for increased production calls for the efficiency and accuracy of Gledhill-Brook Recorders.*

GLEDHILL-BROOK
TIME RECORDERS and Costing Systems

Enquiries to:
GLEDHILL-BROOK TIME RECORDERS LTD
60 EMPIRE WORKS · HUDDERSFIELD

in the service of hygiene



Pyrotenax

COPPER COVERED MI CABLES

This illustration of the Dental Clinic at Guy's Hospital, London, may arouse painful memories, but it serves also to remind us of the great strides made, of recent years, in the technique of dentistry.

It is fitting, therefore, that the equipment of up-to-date dental clinics such as Guy's should also reflect the benefits of scientific research; as exemplified in the use of 'Pyrotenax' cables for the all-important lighting and sub mains circuits—applications where reliability and safety are essential. 'Pyrotenax' reliability, and freedom from maintenance problems result from the fact that 'Pyrotenax' copper covered mineral insulated cables are wholly inorganic, and therefore completely non-deteriorating. Like good dental fillings, once put in place they may well outlast the 'structure' surrounding them.

A non-technical description of 'Pyrotenax' is given in our booklet "Current Carrying". For the technical man "Technical Data" is available—write for your copy.

PYROTENAX LIMITED, HEBBURN-ON-TYNE

Phone : HEBBURN 32244/7

LONDON Phone: Abbey 1654/5
BIRMINGHAM Phone: Midland 1265
GLASGOW Phone: Central 2238
MANCHESTER Phone: Blackfriars 6946
LEEDS Phone: Leeds 27826

current events...

CD3

The use of the trade name "Pyrotenax" is exclusive to the products of this Company and its associates.

* Hot water by electricity?

SADIA

of course!

The Range of Electric Water Heaters, large and small, to meet every need. Each unit is built to a proud standard of perfection arrived at by more than 30 years of specialisation in electric water heating problems.

Please write for fullest details to :—

AIDAS ELECTRIC LTD., SADIA WORKS, ROWDELL RD., NORTHOLT, GREENFORD, MIDDX.

Phone : WAXLOW 1607

Agents for Scotland :— W. Brown & Co. (Engineers) Ltd., 89 Douglas Street, Glasgow, C. 2.

Manufactured in S. Africa by :— Sadia Water Heaters (Pty) Ltd., 3 - 5 Newton Street, Village Main, Johannesburg.

THE

NEW "MIDCOIL"

VARIABLE OUTPUT TRANSFORMER

with superfine voltage control and

OUTPUTS UP TO 20 kVA

Example : 0-280 volts, variable from zero to full voltage in finely graded steps giving control throughout the range to within 0·12 volt at full load, with extremely

GOOD REGULATION

Of particular interest to **Designers** of test equipment and with many other **industrial** uses such as electrical furnaces, etc.

FULL DETAILS AND PRICES ON REQUEST

Other types include : **Low Voltage** Auto Transformers, **3 Phase** and **Phase Conversion** types, designed and produced to customers' specifications.

A.I.D. approved

A Quality Product from

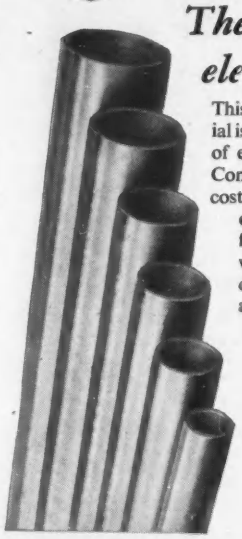
The Midland Coil Winding Co. Ltd.

4 LANCASTER STREET, BIRMINGHAM 4

PHONE : ASTON CROSS 1011 GRAMS : "MIDCOIL, B'HAM"

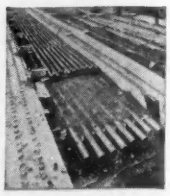
KEY Fibre Conduit

The Key to efficient electrical installations



This non-metallic, pitch impregnated material is now being widely used for the protection of electrical cables everywhere. Key Fibre Conduit is easy to handle, economical in cost and eliminates any electrolytic action on the cable and is recognised as ideal for the purpose. The material is lightweight in character and bends present no difficulty. Technical advice and assistance and quotations—on application.

Key Fibre Conduit is now available in two wall thicknesses-one for laying in concrete and the other for laying direct in the ground.

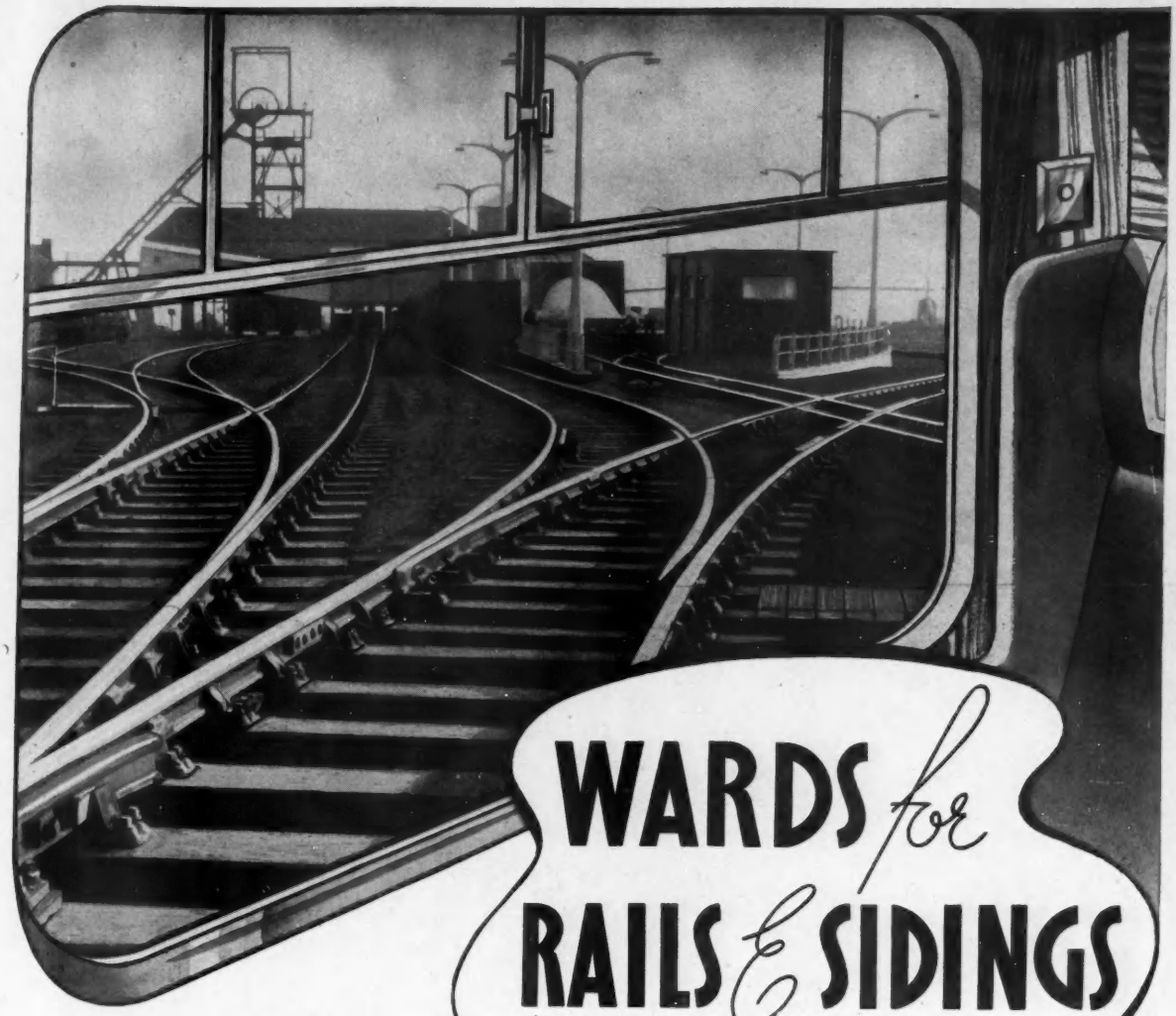


Export enquiries are invited for bulk supplies against payment in Sterling. New illustrated folder gladly supplied on request together with details of the greatly reduced prices available as a result of home production.

The illustration above shows Key Fibre Conduit laid on a bridge by Westminster Electric Supply Corporation Ltd.—45 years ago.

THE KEY ENGINEERING COMPANY LIMITED

London and Manchester 4 Newgate Street, London, E.C.1.
Tel : City 1185-6-7 *Telegrams :* "Keypoint, Cannon, London".
Also at : Elevator Road, Trafford Park, Manchester, 17.



WARDS for RAILS & SIDINGS

The illustration shows part of a large siding laid by Wards at the Primrose Hill colliery near Castleford, Yorks.

Like pages in a catalogue, Ward-built sidings glide by the carriage windows of main line and local trains all over the country. At steelworks and collieries, at refineries and breweries, at quarries and dockyards—here, there and everywhere—industry links its output to British Railways over sidings planned and laid by Ward's skilled engineers.
From the simplest run-in to the largest of industrial installations there is a technical excellence about a Ward-built siding which provides smooth running throughout its span of service.

The Railway Siding Consultants and Contractors

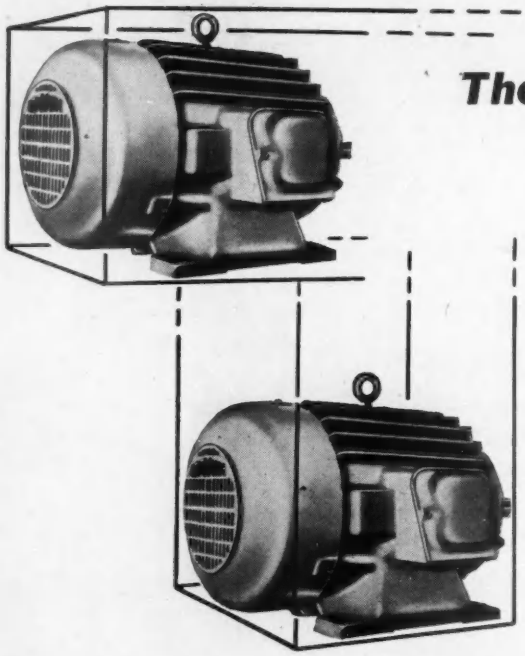
THOS W. WARD LTD
ALBION WORKS · SHEFFIELD
TELEPHONE 26311 (22 LINES) · TELEGRAMS FORWARD SHEFFIELD
LONDON OFFICE: BRETTENHAM HOUSE · LANCASTER PLACE · STRAND · W.C.2

30/30

UMENTS COUNTING INSTRUMENTS COUNTING INSTRUMENTS COUNTING INSTRUMENTS COUNTING
COUNTING INSTRUMENTS COUNTING INSTRUMEN COUNTING INSTRUMENTS COUNTING INSTRUMEN
NSTRUMENTS COUNTING INSTRUMENTS RUMENTS COUNTING INSTRUMENTS COUI
COUNTING INSTRUMENTS COUNTI INTING INSTRUMENTS COUNTING INSTR
ING INSTRUMENTS COUNTING INS ENTS COUNTING INSTRUMENTS
AENTS COUNTING INSTRUMEN NG INSTRUMENTS COUNTING
OUNTING INSTRUMENTS COUNTING INSTRUMENT
STRUMENTS COUNTI NSTRUMENTS COUN
COUNTING INS COUNTING INSTRU
IG INSTRUMEN UMENTS C
ENTS INTING I
UNTING UMENTS
TRUMENTS COUNTI
COUNTING INS OUNTING INSTRUM
G INSTRUMENTS CO G INSTRUMENTS CC
NTS COUNTING INSTRU AUMENTS COUNTING IN
NTING INSTRUMENTS COUNT COUNTING INSTRUMENTS
RUMENTS COUNTING INSTRUMEN OUNTING INSTRUMENTS COUNTIN
COUNTING INSTRUMENTS COUNTING G INSTRUMENTS COUNTING INSTRUME
INSTRUMENTS COUNTING INS
TS COUNTING INSTRUMENTS
ATING INSTRUMENTS COUNTIN

Illustrated is our Medium Size Rotary Ratchet Drive Five Figure Counter with reset. Details of this and other models are given in our leaflet No. 1.

COUNTING INSTRUMENTS LTD.
5, ELSTREE WAY, BOREHAM WOOD, HERTFORDSHIRE
Telephone: ELSTREE 1382-3-4 Cables: COUNTHOR, BOREHAMWOOD



The fitting answer . . .

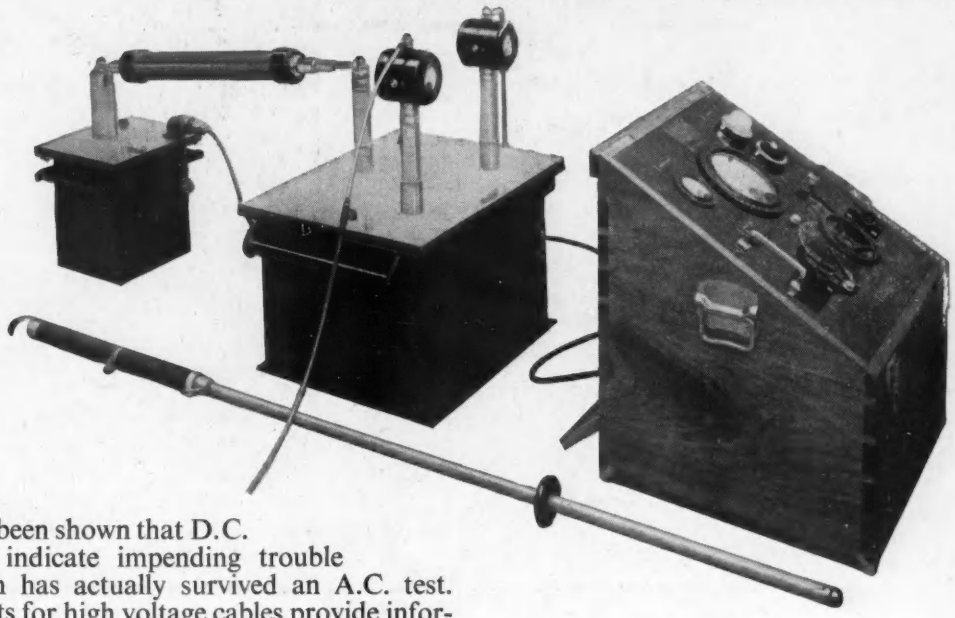
Users of motors for driving machinery will probably find the answer to their standardised motor needs in the Brush 'B' range of squirrel cage, totally enclosed, fan cooled types. They are built to British Standard Dimensions (B.S. 2083, 1954) which determine all basic fixing and general physical dimensions to ensure that these motors are interchangeable with other B.S.D. Motors.
Designed and built from accumulated experience gained from over 70 years of electric motor manufacture, these sturdy machines will meet arduous conditions of service.
The range of sizes available covers from 1 to 25 h.p.
WRITE TODAY FOR STOCK LIST

B.S.D. Motors by BRUSH

BRUSH ELECTRICAL ENGINEERING CO. LTD., HOPKINSON WORKS, CARDIFF, GREAT BRITAIN

BIRMINGHAM · BRISTOL · GLASGOW · IPSWICH · LEEDS · LONDON · LOUGHBOROUGH · MANCHESTER · NEWCASTLE · SHEFFIELD
842

LENGTHEN THE LIFE of HV cables



It has repeatedly been shown that D.C. tests will often indicate impending trouble in a cable which has actually survived an A.C. test. Regular D.C. tests for high voltage cables provide information which permits a higher level of maintenance, and thus considerably lengthens the life of a cable.

HERE ARE A FEW MORE of the MANY ADVANTAGES offered by the ***SenTerCet*** *D.C. Cable Testing Equipment:*

★ **Provides a highly sensitive check on the presence of moisture in cables, joints and terminations.**

★ **A few milliamps of D.C. can break down an incipient fault without appreciably affecting the cable other than along the path of discharge.**

★ **Whilst the effect of an A.C. test depends fairly critically upon the time element, D.C., on the other hand, will usually fail a weak cable, or induce signs of failure, within five minutes.**

Bulletin F/CT.1. contains full details of both transportable and trailer-mounted equipments.

SenTerCet
RECTIFIER EQUIPMENT
Registered Trade Mark

Standard Telephones and Cables Limited

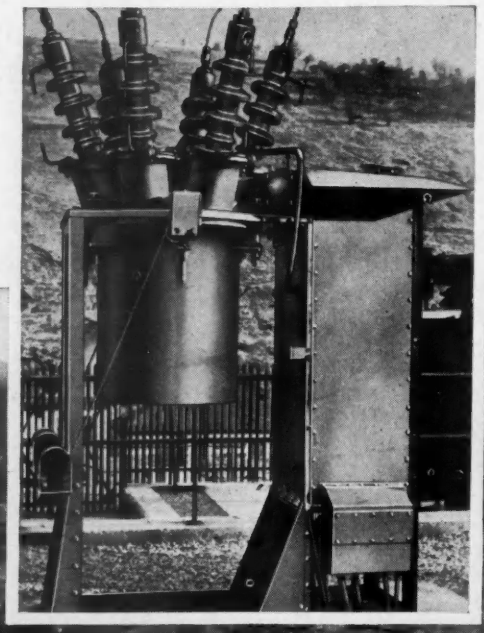
Registered Office : Connaught House, Aldwych, London, W.C.2

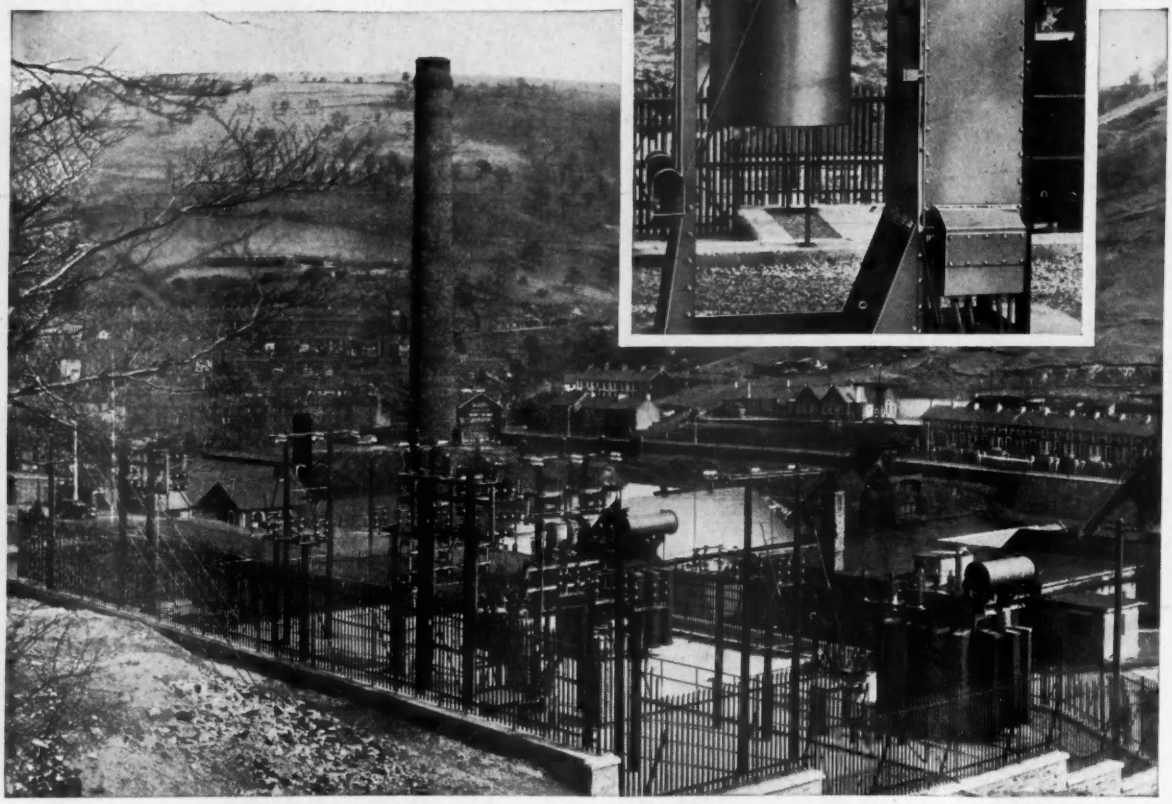
RECTIFIER DIVISION : Warwick Road, Boreham Wood, Hertfordshire
Telephone : Elstree 2401 Telegrams : Sentercel, Borehamwood

33kV OUTDOOR SWITCHGEAR

A Monmouthshire colliery sub-station equipped with S.W.S. 33,000-volt, 500-M.V.A outdoor oil circuit breakers.

CERTIFIED TEST PERFORMANCE AT 33kV : 50 TO 1,000 M.V.A.





SOUTH WALES SWITCHGEAR LTD

BLACKWOOD · MONMOUTHSHIRE

GI4

The supply of power to industry . . .

Since 1895 . . . The Supply of Power to Industry by electricity has depended upon the safe and enduring qualities of the electric cables. Well known to engineers for their superb performance and reliability CONNOLLYS' Paper Insulated Power Cables have "grown-up" with the mighty giant of Electric Power. Many Area Electricity Boards, Collieries and Railways rely on CONNOLLYS' Cables knowing that in our modern factory we, ourselves, carry through every stage of manufacture from wire-drawing, to final testing.

CONNOLLYS' Paper Insulated Power Cables are produced to British Standards and other specifications from 660 to 11,000 volts. Special finishes can be manufactured to customers' own requirements.

Certification Mark

CONNOLLYS
BLACKLEY (LIMITED)

Founder members of the C.M.A.

HEAD OFFICE: MANCHESTER 9
Phone: CHEetham Hill 1801 **Grams: "Connollys Blackley"**

London Office :
34 Norfolk Street, Strand, W.C.2
Tel : TEMple Bar 5506

Birmingham Office :
15-17 Spiceal Street, BIRMINGHAM 5
Tel : Midland 2268

HOOVER F.H.P. MOTORS

DISTRIBUTOR SERVICE

NATION-WIDE distribution of Hoover F.H.P. Motors exists through the following distributors. Any of them will welcome the opportunity of discussing your requirements.

AUTHORIZED DISTRIBUTORS:

ANDOVER
Wm. Dibben & Sons Ltd.

BELFAST
Hendron Bros. (Belfast) Ltd.

BIRMINGHAM
The Donovan Electrical Co. Ltd.
E.G.S. Co. Ltd.

BLACKPOOL
Hirst, Ibbetson & Taylor Ltd.

BOSCOMBE
Wm. Dibben & Sons Ltd.

BRADFORD
Herbert Smith (Bradford) Ltd.

BRISTOL
Simpson, Baker & Co. Ltd.

CARDIFF
Simpson, Baker & Co. Ltd.
Sound Ltd.

CROYDON
Alliance Wholesale Ltd.

DUBLIN
Hendron Bros. (Electrical) Ltd.

EXETER
Simpson, Baker & Co. Ltd.

FARNHAM
Wm. Dibben & Sons Ltd.

GLASGOW
Scottish Precision Eng. Co.

GUILDFORD
Sun Electrical Co. Ltd.

HULL
E.G.S. Co. Ltd.

IPSWICH
Simpson, Baker & Co. Ltd.

KING'S LYNN
J. J. Eastick & Sons, Ltd.

LEEDS
E.G.S. Co. Ltd.
Sun Electrical Co. Ltd.

LIVERPOOL
British Rawhide Belting Co. Ltd.
Hirst, Ibbetson & Taylor Ltd.

LONDON
Acorn Machine Tool Co. (1936) Ltd., W.4.
Alliance Wholesale Ltd., W.C.1.
British Central Electrical Co. Ltd., E.C.1.
British Rawhide Belting Co. Ltd., W.1.
Jeary Electrical Co. Ltd., E.C.1.
G. E. Jones & Sons Ltd., E.10.
H.R.P., Ltd., S.W.3.
Refrigeration Spares Ltd., E.11 and E.C.1.
Rocke International Ltd., S.E.1.
Simpson, Baker & Co. Ltd., S.W.1.
Sun Electrical Co. Ltd., W.C.2.
William Urquhart, Ltd., S.W.17 and S.W.18.

LUTON
Alliance Wholesale Ltd.

MAIDSTONE
Alliance Wholesale Ltd.

MANCHESTER
Hirst, Ibbetson & Taylor Ltd.

NEWCASTLE
E.G.S. Co. Ltd.
Sun Electrical Co. Ltd.

NEWPORT, I.O.W.
Wm. Dibben & Sons Ltd.

NORWICH
Eastick & Sons, Ltd.

SALISBURY
Wm. Dibben & Sons Ltd.

SHEFFIELD
Ratcliff (Electric) Ltd.

SLOUGH
Sun Electrical Co. Ltd.

SOUTHAMPTON
Wm. Dibben & Sons Ltd.
Simpson, Baker & Co. Ltd.

STOKE
E.G.S. Co. Ltd.

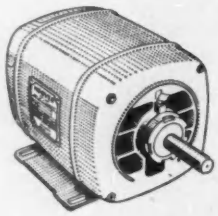
SWANSEA
Simpson, Baker & Co. Ltd.

TORQUAY
Wm. Dibben & Sons Ltd.

WEMBLEY
Sun Electrical Co. Ltd.

WINCHESTER
Wm. Dibben & Sons Ltd.

WORTHING
Wm. Dibben & Sons Ltd.



HOOVER LIMITED

INDUSTRIAL PRODUCTS DEPARTMENT

CAMBUSLANG · LANARKSHIRE · SCOTLAND

ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY 22 JULY, 1954
Volume No. 126 Number 3272
REGISTERED AS A NEWSPAPER

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2.
Telephone: HOLborn 6016
Telegrams: Equivolt, Estrand

Editor and Managing Director:
ROY BALDWIN, M.I.E.E., Barrister-at-Law

Assistant Editors:
J. K. JOHNSON, B.SC.(ENG.), A.M.I.E.E.
K. C. POUNDS, B.SC.(ENG.), A.C.G.I., A.M.I.E.E.

In This Issue

Radio Communication as an Aid to Power System Operation, Part III, by *R. E. Martin*, D.F.H., A.M.I.E.E. 109
Readers' Views 114
Retail Trade in 1950 115
Research in Mechanical Engineering ... 116
Around the Trade, by *Peregrin* 117
Preventing Peak Power Cuts 118
Rubber in Liquid Form 120
Off-Shore Station at Port Augusta 121
Electronics on Show in Manchester 122
Power Supply Statistics in June 123
Overseas News 124
Personalities in the Industry 126
I.E.E. Council and Chairmen 128
Problems and Practice in Engineering ... 129
Equipment for Industry 130
For the Electrical Trade 131
News of the Week 132
Questions in Parliament 136
Company Activities 137
Electric Supply News 138
Commercial Information 139
Classified Advertisements 43
Index to Advertisers 50

SUBSCRIPTION RATES

United Kingdom and Overseas £2. 10s. 0d. per annum. Canada $7.50, U.S.A. $7.50 per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies price 9d. each.

PURSE STRINGS ON H.P. TRADE

A fortnight ago we reviewed the factors that were favourable to an imminent change in Government policy on hire purchase trading; only a few days later the Board of Trade revoked the existing Orders. The reactions of retailers to the new trading conditions have been instant. Hire purchase terms have commonly been extended from the former maximum of eighteen months to two years but it is initial deposits which have shown the greatest change, dropping from 33% to 10% and some of the largest retailers have gone to the limit, in advertising "no deposit" terms. The public, however, is showing no great signs of interest in the new purchasing facilities, it will take more than this to stimulate a spending boom in the holiday season, but when the traditional buying periods come round, it is then that the full effect of this new relaxation will be felt. The lack of any onrush of spending is fortunate, for although the legal restrictions on hire purchase have been removed, financial ones still remain. The action of the Board of Trade has not affected the Treasury's request to finance houses for a 10% cut in hire purchase advances, so that any sudden trade boom might have failed to find the requisite financial backing. Clearly, if the Government is to maintain a uniform policy the Treasury should remove this embargo within the next few weeks. Otherwise, if trading really gets going in the autumn, retailers may find difficulty in obtaining the necessary finance.

SIMPLIFYING THE SCOTTISH BILL

Whatever may be one's views on the Bill creating the South of Scotland Board, there has been no diversity of opinion on the lack of wisdom in setting up by statute executive organisations in the East and West, subservient to the main Board. After prolonged attack in Parliament, the Government has agreed to the deletion of the clauses constituting these executives, leaving the future board freedom to adopt whatever form of organisation they think fit. No doubt the original insertion of the clauses in the Bill was made with an eye to the existing organisation and to ensure as little disturbance as possible with the existing staff. On the other hand, as we pointed out at the time, setting up an overriding board was hardly in keeping with the spartan ideas on administration in Scotland. Now the advent of the South of Scotland Board itself must be awaited before an inkling of the organisational structure can be had, but unless full sized executives are retained, it is difficult to foresee how

the welding of the two areas can be achieved without certain limited redundances at senior level. Is there any significance to be read into the lack of any hurry by the Minister of Fuel to appoint a chairman to the North Eastern Board, a position which has been vacant for three months!

A CONTRACTOR'S LIABILITY

An electrical contractor is liable for negligence in carrying out an installation and there has recently been before the courts a grim reminder of this liability. In connecting up a boiler, earthing was provided by an 18 in. rod buried in the ground, which was found to be unsatisfactory except in wet weather. Three months after installation, a fault developed on the boiler which was responsible for the death of the housewife. This case serves to underline once more the importance of a proper appreciation of the fundamentals of earthing. It is a good maxim always to test the earth connection; when there is no water pipe to rely on and recourse must be made to buried earths, then a proper test becomes essential unless earth-leakage breakers are installed. In this particular case no such test had been made and the suggestion, that the onus of testing the earth was placed on the electricity board when the contractor asked them to test and inspect the installation, was not allowed. Clearly, the contractor cannot delegate his responsibilities and omission of the board to test the earth connection did not make them liable for damages nor excuse the contractor from carrying out the test himself. Although the findings in this particular case on the responsibilities of the supply authority were clear, it is unfortunate that this opportunity was not taken for a general statement of these legal duties. Too often the consumer believes the safety of his installation is guaranteed by the supply authority's test, while it is the contractor himself on whom he must rely.

STATISTICS OF SELLING

From the mass of statistics provided in the Census of Retail Trades, a host of comparisons can be made though they may be of limited utility since the figures relate to the year 1950. Some of the figures related to the electrical trade are given on another page but an equally interesting study can be made between the census figures for gas and electricity showrooms. Gas with a sales force some 10% above that of electricity succeeded in selling over 40% more. Such a comparison, however, is far from fair to showroom staffs since the strength of the gas industry's personnel lay in their full time male staff, which was nearly three times that for electricity. Wide variations in showroom staffing are also shown in the regional analysis and the ratio of the respective personnel varied between 2·6 to 1 either way, electricity staffs being higher principally in the East, South and South West. Despite this diverse pattern, the spread of sales results for the country as a whole was remarkably similar between the two industries. Electricity has therefore no need to be ashamed of its performance bearing in mind the special factors it has to meet, not least of which is the competition from private trade.

MODELS FOR HYDRAULIC DESIGN

No branch of engineering is less amenable to the application of theoretically rigorous design than that of hydraulics. Practically every formula includes somewhere a coefficient which is a function of various arbitrary parameters, and which has been established on the basis of experience derived from tests on full scale plant. Such tests, particularly when carried out on large water turbines as used in hydro-electric stations, present considerable difficulty and expense, and for some time now efforts have been made to derive a means whereby models could be used as a means of forecasting closely the performance of full-size machines. The main difficulty in such a procedure lies in the derivation of scaling-up factors which need to be applied to such functions as Reynolds number and roughness. A major step in this direction is, however, mentioned in the latest report of the Mechanical Engineering Research Board where it is stated that a new "scaling-up" formula has been developed for Kaplan turbines which will not only permit a model to be used for estimation of efficiency at the design point, but will also enable the efficiency away from that point to be predicted. So far the work has been carried out on an analytical basis, and practical verification will be needed to establish its worth. Should, however, the accuracy of the process be within acceptable limits, a major advance will have been made in design and testing of hydraulic machinery.

APPLIANCES NEED PLUGS

One thing characterises the purchase of an electrical appliance in this country, it is not supplied ready for use with a plug attached. No doubt manufacturers would be willing to fix a plug but it is not at all possible to make the correct selection from the variety of standard plugs in current use in the home. In consequence, it is left to the retailer to supply the plug and the customer, who may be spending £10 to £20, to suffer the irritation of paying a couple of shillings extra before he can use the appliance. Unfortunately this is not all. While in some shops fitting the plug is considered part of the service, all too often retailers, unless specifically asked, are content to leave the customer to fix the plug himself. This may apparently be a simple matter but although manufacturers supply very clear instructions on how to connect the plug, such complexities as three wires with two or three terminals, sometimes unmarked, present conditions in which the inexperienced can fall into error, an error which can be dangerous if not fatal. In an industry which is attempting to obtain some tighter control on the safety of electrical installations, it is foolish to allow such a practice, particularly as it may also irritate customers. One day perhaps accessory manufacturers will supply us with a plug, the pins of which can be readily altered without alteration of the wiring. In the meantime the practice of the best retailers should be universally adopted and no appliance should be allowed to leave a shop without the correct plug connected.

Radio Communication as an aid to Power System Operation

PART 3 — *Point-to-Point Fixed Radio Links*

By R. E. MARTIN*
D.F.H., A.M.I.E.E.

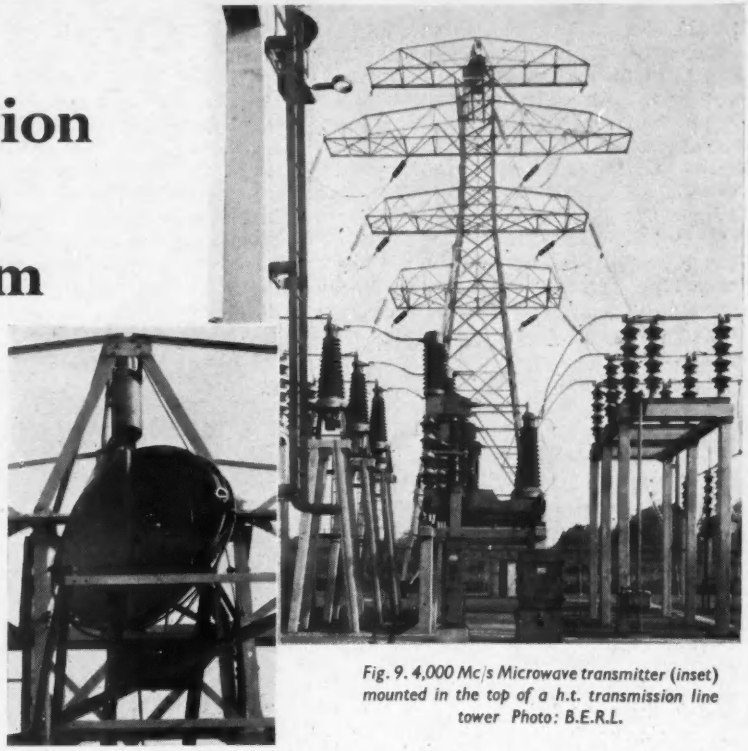


Fig. 9. 4,000 Mc/s Microwave transmitter (inset) mounted in the top of a h.t. transmission line tower Photo: B.E.R.L.

HAVING given some consideration to the application of radio to mobile communications for the power industry in Parts 1 and 2, we can now consider the uses of point-to-point radio links. Such radio links are already in use by the power industry in certain countries where by reason of terrain or other conditions suitable metallic line circuits may not be readily available.

Reliable communications are, of course, essential for the satisfactory operation of a large interconnected network. The control rooms must be in telephone contact with all generating stations and major substations in their respective areas and this alone necessitates a complex private telephone network. Furthermore, the operation of the system requires the telemetering of various quantities from the many remote points to the control rooms via communication circuits. Other requirements for communication circuits arise for the operation of protective and supervisory gear of various types.

In Britain the line circuits are, in general, readily available as a complex public network already exists, but there may, nevertheless, be cases for the use of radio in certain circumstances. Although the B.E.A. are not at present permitted (except experimentally) to operate a radio circuit unless one or both ends are fully mobile, considerable experimental work has been carried out to investigate the suitability of radio in replacing line circuits for telephony, telemetering and protection.

In America and Sweden the use of fixed-to-fixed radio by the power industry is accepted and installation are now in use. For example, in the U.S.A. it has been stated that all Commonwealth Edison generating stations, distributing stations and load dispatchers' offices (control rooms) are equipped with two-way radio for interstation communication during emergencies. However, radio should only be used in circumstances where a definite advantage can be shown, either in the physical arrangement of a scheme, in cost or due to some other special consideration such as the bandwidth of the channel required. The radio link is not subject to failure due to natural causes such as storms, snow, etc., and it is not utilising plant directly connected to the high voltage power system so that maintenance can be effected without taking any power equipment out of service as would be necessary with a power line carrier coupling unit.

*Mr Martin is with the B.E.A. Research Laboratories. The previous article in this series appeared in our issue of 24th June.

Telephony Links

A typical case where radio telephony could be advantageously employed is illustrated in Fig. 10. Each generating station is provided with a direct wire circuit radiating from the control room. Security is achieved by linking the generating stations by a ring circuit so that if, for example, the radial circuit to Generating Station No. 1 becomes faulty the control room can still communicate with No. 1 via No. 2 and the ring circuit. This principle is satisfactory until there is a river estuary in the position shown. The ring circuit between No. 2 and No. 3 Generating Stations must follow the same route as the two radial circuits and it may even have to pass via the same G.P.O. exchanges or through the same multicore cables. The extra security is now jeopardised and could be regained by the use of a simple radio link across the estuary in the position shown.

There is also a case for reinforcing certain radial circuits with radio telephony links. An example of an actual recent emergency application in this field was the complete control of a 285 MW steam station when all line circuits were put out of action by flood damage. Control and ordering of spares and replacements were carried on over a radio circuit which enabled the plant to be run normally.

Such circuits would probably be operated initially in the V.H.F. range, probably in the "high band" at about 180 Mc/s. The cost compares very favourably with a line, and commercial equipment is available which will give the equivalent of a 4-wire telephone circuit with signalling

facilities for dialling, etc. A simple single channel duplex two-frequency working equipment (see Part 1) with signalling apparatus for interconnection to automatic telephone systems at each end, would cost about £300 per terminal. Apparatus for this type of service is generally designed for extremely reliable operation, the circuit components and valves being especially chosen for long life. Fig. 11 shows an equipment of this type, comprising a transmitter receiver unit and combined power and signalling unit. Both units are duplicated and the rack is also provided with a line level measuring set. A common aerial is often employed for simultaneous transmission and reception on the two frequencies, co-axial filters being introduced to enable both the transmitter and receiver to be connected to the one feeder.

The advantages from the power engineer's point of view are: (*a*) lower ultimate cost than a rented line, (*b*) less liable to interruption by war damage, floods, storm, etc., (*c*) faults will be in apparatus under direct control of one authority.

The disadvantages are that the basic circuit noise may be slightly higher than that of a line and the equipment consumes more power than a metallic line circuit.

At present for most B.E.A. purposes a single telephone circuit is adequate but it is worthwhile bearing in mind that unlike a line, which might only transmit speech frequencies (300—2,800 c/s), a radio link may have a much wider bandwidth. In the V.H.F. range it is possible to transmit frequencies up to 20 or more kilocycles. Due to this the radio links can be used to transmit several speech circuits simultaneously by the use of multiplexing equipment.

A certain scheme of this type will provide five 300—2,800 c/s speech circuits and telephone signalling facilities. When such a system is operated over a distance of 50 miles the cost of the two complete terminals, aerials and feeder cables is less than the cost of the copper alone required to derive a single open wire pair. Assuming 200 lb/mile copper for a 2-wire circuit 50 miles long the total weight of metal will be 100 x 200=20,000 lb=9 tons approximately. With the cost of copper taken as £300 per ton, the total cost, excluding poles, insulators and installation, is £2,700. This is in excess of the cost of the two radio terminals for 5 circuits.

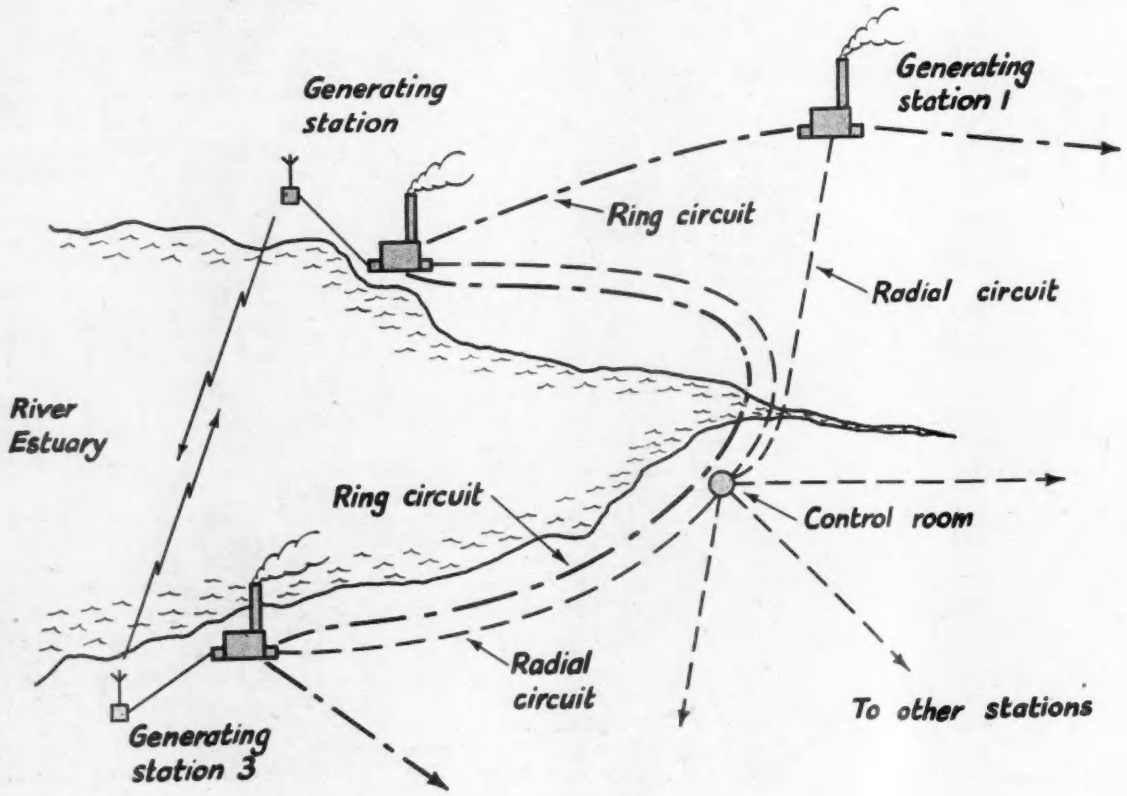
Protective Relaying

Another application of radio could be in the protection field where a signalling circuit is often required between two substations. This application is in some ways similar to the use of power line carrier for the same purpose except that it is not prone to interference from disturbances on the power line itself and would probably be very much cheaper to install.

The main difficulty lies in the availability of frequencies in the already congested parts of the V.H.F. spectrum allocated for fixed services[13] and in the difficulty of working a sufficient distance without relay stations. Relay stations, although technically possible, suffer from the disadvantage of requiring a reliable power supply to energise the radio equipment during fault conditions in the main network.

This problem also applies to the terminal stations, but in this case non-interrupted power supplies will often be already available.

Fig. 10. A typical case where radio telephony can be employed to its best advantage. The river estuary, shown, precludes the use of a complete ring circuit, but in the event of a fault arising on the existing system, a radio link can ensure effective control and communication between generating stations and central control



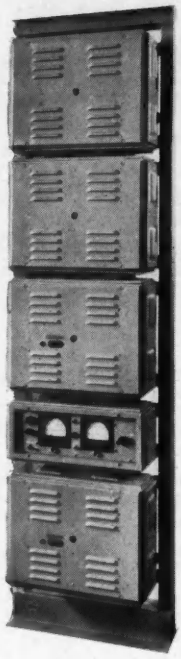


Fig. 11. Duplicated equipment for single V.H.F. telephony channel (by courtesy of A.T.E. Ltd.)

It is just during the few cycles of the fault on the power system when the auxiliary supply voltage may be fluctuating that the radio equipment must be in operation. Various means are adopted to overcome this trouble such as the use of secondary batteries, motor generator sets with fly-wheels, petrol or diesel generators which may be running continuously or may start and clutch into an a.c. motor driven generator when the a.c. supply fails.[14] Another scheme is to use heavy duty vibrators of superior construction which would continue to supply a.c. to the electronic equipment, probably from the substation tripping battery. Such vibrators are becoming available and will probably offer a satisfactory solution to this problem, which applies not only to radio equipment but to power line carrier apparatus and certain other forms of electronic equipment used for protective gear operation.

There are certain cases where a workable path exists on V.H.F. frequencies for a protection link and very often these paths will lie across water to islands or across rivers and bays where a direct metallic line circuit may be impracticable. For such a specialised application equipment similar to that illustrated in Fig. 11 would probably be suitable. The radio link could then be used to transmit intertipping signals or phase comparison signals for use with a protective system working on this principle.

The signals may be either in the form of one or more audio or voice frequency tones which would be filtered out at the receiver and utilised to operate the protective gear or alternatively a carrier shift principle could be used alone or in combination with tones to produce the same result. It is possible to render such a system safe from incorrect operation by transmissions on the same frequency though it may not be possible to guarantee correct operation under these circumstances.

One of the great advantages of the use of radio for a phase comparison protection link lies in the absence of appreciable phase shift which limits the performance of certain schemes when operated through line circuits.

The three-phase currents can either be summated and used to control the transmission to the remote end or their phase positions could be sent simultaneously over the same radio link equipment for comparison at the far end. Such schemes require to be arranged for simultaneous duplex operation so that at both ends of the power line it is possible to make a phase comparison between the local power currents and those at the remote station. Under normal load conditions the currents are substantially in phase but under conditions of a fault in the protected zone they become in antiphase. Systems working on these principles have been tested on a laboratory basis but no actual installation has yet been made. Special circuits have been devised to take into account the conditions when one end of the power line is switched out giving no line current at that end and capacity currents at the remote end. As the equipment is fundamentally electronic the phase comparison is also carried out with valve circuits which are all arranged to "fail to safety" by giving a fault alarm and not an erroneous tripping operation.

Intertripping

An intertripping system has been tried experimentally using modified equipment which was unfortunately not suitable for a long-term trial. A standard type of d.c. intertripping equipment was used to code the signals and de-code them after reception at the remote station. The d.c. intertripping equipment was originally designed to pass a pre-determined code of d.c. impulses into a line circuit, the code consisting of a train of impulses having either negative or positive polarity. By carefully choosing the code it is possible to render the system safe from interference on the line such as ringing or speech voltages.

During the experiment it was not possible to transmit the d.c. impulses over the radio link as this was designed for amplitude modulation. A voice frequency code system was therefore used in which the train of d.c. impulses from the intertripping equipment, instead of being passed to a line, was converted to impulses of voice frequency at 840 or 1,560 c/s corresponding to normal or reversed d.c. polarity to line. These frequencies were used to modulate the transmission which was received at the remote station where, after demodulation, the frequencies were filtered and used to operate high-speed relays. The contacts of these relays controlled a local d.c. supply which was applied to the standard de-coding equipment usually used on a telephone line.

Fig. 12. Seventy centimetre radio telephone equipment on test

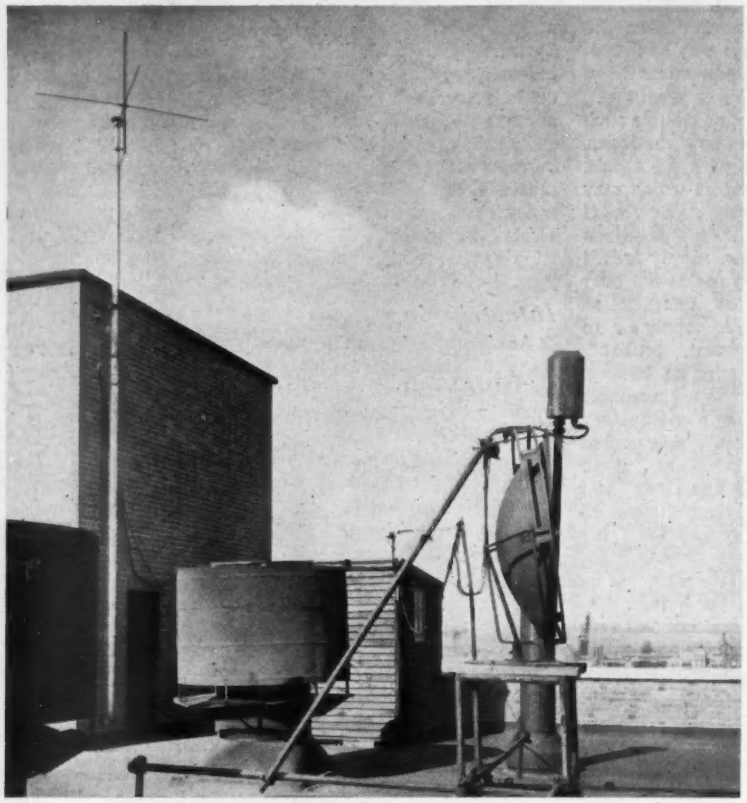


Fig. 13. A microwave link antenna equipment mounted on the roof of a high building

The radio and voice frequency equipment, therefore, replaced the telephone line normally used for intertripping. The radio path was about 16 miles long and part of it lay over water. Arrangements were made to send a signal over the equipment every 30 minutes and recording apparatus was provided at the receiving end to monitor the operation of the system. The equipment operated satisfactorily for a short period but suffered from a number of inherent defects primarily due to the fact that the various pieces of apparatus were originally intended for other purposes.

The arrangement was entirely of a makeshift experimental nature and it is believed that a properly-designed unit made specifically for the purpose would overcome the difficulties encountered.

Frequency Choice

As all previous B.E.A. experiments were made using V.H.F. equipment working in the range 70—90 Mc/s or 170—190 Mc/s, it was decided to investigate the possibility of using higher frequencies where the spectrum is not so congested and wider bandwidths are available. The first frequency band to consider is in the vicinity of 460 Mc/s (70 cms) and Fig. 12 shows an experiment being carried out with equipment operating at this frequency. The small size of the yagi aerials can be seen from the photograph.

Microwave radio links, that is links working on centimetre wavelengths, are in use in America by the power industry.[15, 16] Such equipment is capable of linking points along semi-optical paths by means of a low power highly directional beam of radiation. These frequencies are unaffected by man-made interference but fading can occur due to atmospheric conditions.[2]. Such links, both temporary and permanent, are, of course, now an accepted part of the television service where the wide bandwidth of the equipment is essential to enable the transmission of the picture content.[17, 18, 19]

No microwave equipment specifically designed for the power industry has been tested by the B.E.A. and it is doubtful if the inherent wide bandwidth can be used to full advantage on the British network except for one special application which will be described later.

The main advantage of microwave equipment lies in its freedom from interference and possibility of obtaining a wide bandwidth. The equipment tends to be highly specialised and consequently rather costly. On the other hand the microwave frequently spectrum is not crowded with other users and it may be that frequencies of the order of some thousands of Mc/s may be more readily allocated for fixed-to-fixed applications.[20].

At frequencies up to about 1,000 Mc/s standard techniques are applicable although special valves may be required in the transmitter and in the early stages of the receiver. The aerial system can still be connected by means of co-axial lines and the ultra-high frequency tuned elements of the equipment may be co-axial sections or cavities.

At frequencies much above 1,000 Mc/s it becomes necessary to use waveguide technique which results in a higher cost due to the extreme accuracy of the workmanship required. Furthermore there is not a great quantity of such equipment in use which results in the valves in the radio frequency section of the equipment often being hand-made special types. While these appear to give good reliability the cost is likely to be higher than that of the more readily available standard types.

It has been stated by the Bonneville Power Administration that a 1,700—1,850 Mc/s band duplex microwave link becomes cheaper than a carrier system when more than four channels are required. It is suggested that the Administration will use their microwave installation for telemetering, supervisory control, relaying and communications as well as facsimile and fault location.

One type of fault locator developed by the Bonneville Power Administration operates on the principle of timing the arrival of surges generated by the power fault itself. When a power line fault occurs surges are propagated along the line in each direction towards the terminal stations. When the surge arrives at end "A" it triggers an electronic timer counting microsecond intervals. The surge arriving at end "B" is delayed and returned to end "A" over the microwave radio channel where it is received and utilised to stop the electronic timer.

The time interval is a measure of the distance to the fault. The instrument prints the distance automatically on a paper chart. The wide bandwidth of the microwave channel is, of course, essential for the transmission of the short pulses required.[21, 22]

BEA Microwave Experiments

In this country the B.E.A. have made experiments with microwave radio links operating at frequencies of 4,000 and 10,000 Mc/s. The 4,000 Mc/s equipment was kindly loaned by the manufacturer and was originally intended for the provision of a temporary wide band single-way link for television outside broadcast purposes. It was a laboratory built model of the type used on the first London —Paris television link. The transmitter and receiver used 5 ft diameter parabolic reflectors on which were mounted the waveguide systems with the microwave components contained in a watertight case. Fig. 9 shows the "dish" mounted on a substation terminal tower. The microwave transmitter is contained in the small canister above the paraboloid whereas the power supply unit is located at ground level. It must be remembered that this particular equipment was not intended to provide a continuous service, being designed for short period use during outside broadcasts. The inclusion of valves in the canister, which must be mounted at a considerable height, rendered maintenance difficult for a power system application. It is possible to use passive reflectors if the loss can be tolerated thereby maintaining the electronic equipment at ground level.[23] Such passive reflectors have been used to reflect microwave energy over a mountain peak. After some initial setting up difficulties the link was operated for a period over a path about 16 miles long. The equipment was capable of transmitting signals extending from d.c. to several Mc/s and a multiplexing unit using radio frequencies was built up to monitor the operation of the radio link.

The receiver location is shown in Fig. 13 in which the multicore cable connecting the microwave receiver to the power unit and main intermediate frequency amplifier can be seen suspended from the corner of the hut housing the main equipment. This is shown in Fig. 14 in which the upper rack mounted unit was used to operate a metering printometer over the radio link.

The link in question suffered from the following disadvantages which would undoubtedly render it unsuitable for service use unless considerable improvements could be effected: (*a*) high cost of equipment compared with lower frequency radio sets; (*b*) complexity of the receiver owing to the original design being for use with very wide band signals (e.g. television video waveforms). The wide bandwidth could not find any application to the B.E.A. communication system as at present known. A bandwidth sufficient for one or two speech channels appears to be adequate; (*c*) unreliability for long period unattended operation. It must be pointed out that an improved version of this equipment is now available but that neither equipment is designed for the power industry application, being intended for temporary television links only.

An early Ministry of Supply equipment was tested which operated at about 10,000 Mc/s (3 cm). This equipment known as TR 1906 was intended for military applications such as where a single telephone circuit was to be extended over a river.[24]

This equipment, which is very compact and portable, utilises a novel principle in which the reflex klystron oscillator output is divided and used partly for transmission to the remote receiver and partly for heterodyning the incoming microwave energy from the remote transmitter.

Tests with this equipment showed that although it appeared reliable, insufficient ranges were obtained for the average applications to be found in the power industry.

Since these comparatively elementary sets of early design were tested there have been many developments in circuit technique and components, particularly in the availability

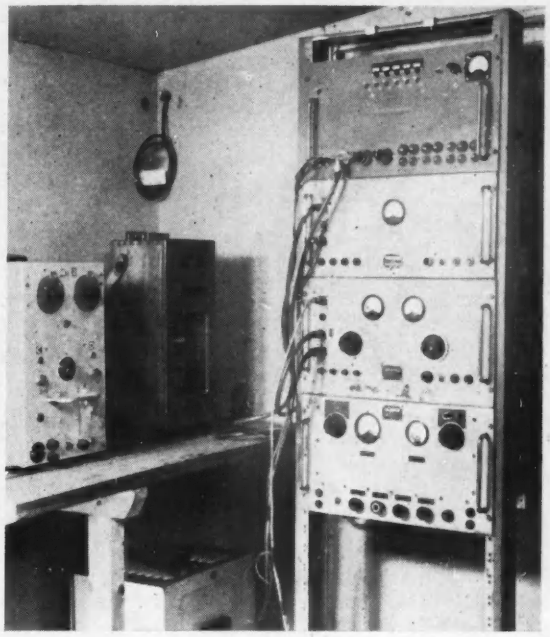


Fig. 14. Microwave receiver and multiplex unit connected with the radio link in Fig. 13. The upper unit operated a metering printometer

of "special quality valves" having excellent reliability. Such valves are now offered by several manufacturers and must have a bearing on the application of electronic techniques to power industry apparatus of various types where extreme reliability is essential.

Another microwave link equipment of early design was the Wireless Set No. 10. This apparatus used pulse length modulation and provided eight telephone channels.[25]

A modern multi-channel microwave link operating in the frequency range 1,750—2,300 Mc/s (which range has been allocated by the International Telecommunications Convention at Atlantic City in 1947 to world-wide use for fixed and mobile telecommunications) would use valves designed to last at least 10,000 hours. Such an equipment is commercially available and being intended for trunk telephone circuits, will provide 60—240 telephone channels on a frequency division multiplex basis in the frequency band 60—1,052 kc/s.

While it appears unlikely that such link equipments would find any wide application in the power industry in Great Britain it is possible that simpler versions might be useful, particularly in special cases such as the proposed cross-channel cable or if it is desired to install fault location equipment on the 275 kV system.

Conclusion

In conclusion it can be said that mobile radio communications are now well established although their use is not as widespread as in the United States. The use of such equipment on a scale sufficient to have an effect on the day-to-day maintenance of the power system undoubtedly saves time and contributes towards a more reliable public electricity supply service.

The application of radio to fixed services must depend on the allocation of frequencies and the realisation that radio may well prove the sole means of maintaining communications to operate the power system under defence conditions.

The author wishes to express his thanks to Dr J. S. Forrest, Director of the British Electricity Laboratories for his comments and assistance in preparing the article. He would also like to thank the Electricity Boards, Divisions and the equipment manufacturers who have supplied information contained in this series of articles.

REFERENCES

14. B. W. David, E.M.F. Unit Supplies Reliable Power, Electrical World, 19th October, 1953, p. 128.

15. W. G. Farmer, Microwave the backbone of TVA's expanded Communications, Electrical World, 19th October, 1953, p. 124.

16. D. R. Pattison, M. E. Reagen, S. C. Leyland, F. B. Gunter, Field Testing a Microwave Channel, Electrical Engineering, December 1950.

17. A. T. Starr, T. H. Walker, Microwave Radio Links, J.I.E.E. 1952, Vol. 99, Part III, p. 241.

18. H. Grayson, T. S. McLeod, R. A. G. Dunkley, Circuit Technique in Frequency Modulated microwave Radio Links, J.I.E.E. 1952, Vol. 99, Part III.

19. G. King, L. Lewin, J. Lipinski, J. B. Setchfield, Microwave Techniques for Communication Links, J.I.E.E. 1952, Vol. 99, Part III.

20. A.I.E.E. Committee Report. Microwave Channels for Power System Applications. Trans. A.I.E.E. 1949, Vol. 68, p. 40.

21. R. F. Stevens, T. W. Stringfield, A Transmission Line Fault Locator using Fault-Generated Surges. Trans. A.I.E.E. 1948, Vol. 67, p. 1168.

22. L. J. Lewis, A Review of Fault Locator Problems, Bonneville Power Administration, 7th November, 1950.

23. Microwave Relay Link for Television, Electrical Communications, March 1953.

24. D. G. Reid, J. K. Garlick, J.I.E.E. 1947, Vol. 94, Part IIIa, No. 14.

25. E. G. James, J. C. Dix, J. E. Cope, C. F. Ellis, E. W. Anderson, The Development of the Wireless Set No. 10: an early application of pulse length modulation. J.I.E.E. 1947. Vol. 94, Part IIIa, No. 13, p. 517.

READERS' VIEWS

Correspondents writing under a pseudonym are asked to submit their names in confidence to the Editor

Connecting Appliances

YOUR correspondent J. H. Robinson's experience with a wrongly connected 15 amp plug ("Problems and Practice," 24th June) reminds me of a recent occasion when I was asked to check a small car heater, the owner of which had complained of receiving an electric shock. The heater had only recently been purchased and was of the small cylinder type consuming 500 W at 250 V and guarded by a perforated metal frame. A three-core T.R.S. flexible cord, connected to a bayonet adaptor and inserted in a lamp holder, was the means by which the heater was connected to the supply.

On testing the metal guard to earth, I found a p.d. of 250 V—the full test voltage—which could have been fatal to anyone handling the heater. The fault was found to be due to the fact that the "earth" wire, which was connected at one end to the metalwork of the heater, not being required, had been cut short at the adaptor end. In screwing on the bakelite cover of the adaptor, however, the short end of the "earth" wire was forced hard on to one of the terminal screws thus making the metalwork "live" when the heater was plugged into the supply.

Had a fatality occurred, it would have been said that such apparatus should never have been connected to a bayonet adaptor, without the metalwork being effectively earthed, but how is the novice going to be prevented from doing this sort of thing? It is daily practice.

If a three-pin plug is used for connecting current consuming apparatus to the supply, the novice frequently connects it wrongly. This is because he does not understand the real purpose of having three wires. The novice is not entirely to blame in this matter; cable manufacturers must take their share of the responsibility. Some amateurs do understand the use of the "earth" wire and know how to connect a three-pin plug, but are usually puzzled by the colour scheme. They know that "red" is "live," but are unable to tell the difference between Blue, Black, Brown, Grey, White, Green and Yellow, with the result that whereas the experienced electrician would test through for the "earth" wire, they hazard a guess and pick the wrong one.

The I.E.E. Regulations, Section 3, 309 (B) clearly state the covering of the earth continuity conductor in a flexible cord or cable shall be coloured green, or in the case of a flexible cable, white with green sleeves and Reg. 311 states that the neutral shall be black or blue, the latter colour being specifically debarred from use with flexible cords although permitted for flexible cables. Why then do we get Brown, Grey, Yellow and White included?

Another type of accessory commonly used in the home is the flat two-pin plug and socket connector. I heard of a case where one of these was used to lengthen the lead of a standard lamp. The two sections had been put on the wrong way round, and got pulled apart when for some reason the lamp had been moved, thus the "plug" which was left laying on the floor was live. A baby picked it up and put it in its mouth.

The house owner cannot be expected to call in an electrician every time it is required to put a plug on a lead or repair a fuse. These are small jobs which should be within the capability of all house owners, but they must be educated to do these small jobs correctly and the best answer as far as I can see is to publish a "Code of Domestic Electricity," by which people can be taught the correct way to connect a three-pin plug, the importance of earthing metal appliances, the use and abuse of the bayonet adaptor, how to repair a fuse and the reason why the correct size fuse wire must be used. The danger of using portable electric fires in bathrooms, the point of checking the current capacity of the electric meter before installing an immersion heater and many other items should be embodied in this little book which should reach every home in the country free of charge, because all these things are done and will continue to be done in the home by the amateurs.

J. E. Hooper,
EWELL, SURREY.

Simplicity of Earthing

I HAVE read your leading article on the "Simplicity of Earthing" with more than usual interest because the subject is one to which I have on occasion given some attention. You say that alternative methods are inevitably more costly to apply but perhaps this is because the amount spent on earthing is often less than that required to do the job properly. If we just connect to the water tap without finding out whether it does any good it will always be the cheapest method, unless indeed manufacturers of protective gear compete by offering circuit-breaker cases without operating mechanisms inside!

H. W. Swann.
LONDON, S.W.1.

Electrical Trade in 1950

CENSUS OF DISTRIBUTION AND OTHER SERVICES NOW ISSUED

PUBLISHED today is the second volume of the Census of Distribution Report, covering Retail and Service Trades (H.M.S.O. £1. 2s. 6d.). This analyses in detail the persons engaged in the retail trade, the variability of the gross margin (the difference between sales and purchases, less stocks at the beginning of the year plus stocks at the end of the year) in the various types of business, the ratio of wages and salaries to gross margin and the sales of commodities and provision of secondary facilities. These and other data are referred to geographical areas in Great Britain, and subdivided into town sizes, size of business, organisation of business and so forth.

As far as the electrical industry is concerned, four principal categories of retailer have been dealt with: "radio, electrical goods," "radio, electrical goods with repairs," "electrical goods with contracting" and "electricity showrooms." There is also a section under the vehicles group of "cycles and radio goods." It should, however, be remembered that "electrical contracting" is outside the scope of the census, and establishments combining electrical contracting with retailing made, where possible, a separate return for the retail side in which case they were classified as "radio, electrical goods." If separate particulars were not available, a return for the whole business was accepted and establishments having more than 50% and less than 80% of receipts from electrical contracting were included, providing the annual sales of goods were greater than £500 and made from a retail shop.

Table I shows the main data dealing with these categories. Not included in this table, however, is the fact available from the census, that apart from the electricity showrooms, which are administered by the electricity boards, no less than 9,786 people out of the 43,512 engaged are working proprietors and unpaid helpers, either part or full-time employed. This provides a significant indication of the extent of the small family business in the trade.

By far the largest number of establishments lie within the sales range of £2,500 to £50,000 per annum, and are fairly evenly distributed over this range, although there are a few in the £100,000 to £250,000 range. No electricity showroom has reached this figure, the great majority having sales of between £5,000 and £25,000 per annum. Twelve, however, succeeded in attaining sales in the range £50,000 to £100,000.

Greater London together proved generally to be the biggest purchaser of electrical equipment, £23 millions being spent in the area during the year. Next largest area was that of the North West with £12 millions. These figures are naturally a function of the urban population.

A section of the census deals with establishments grouped by form of organisation, by kind of business. This differentiates between individual businesses, ones having several branches, and the co-operative societies. Much electrical information is missing from this section due to unwillingness on the part of some of the organisations concerned to disclose their figures. In the radio and electrical goods category it is of interest to note that co-operative societies have 62 establishments with sales of £928,000 per annum out of a total sales figure of £58 million for all organisations.

TABLE II. DISPERSION OF SALES/PERSON ENGAGED

Category	Organisations	Sales per person engaged		
		For one-quarter of the organisations lies below	For one-half of the organisations lies below or above	For one-quarter of the organisations lies above
		£	£	£
Radio, electrical goods	4,455	950	1,610	2,450
Radio, electrical goods with repairs ...	2,207	530	880	1,340
Electrical goods with contracting... ...	1,157	740	1,030	1,400
Electricity showrooms	15	2,730	3,500	4,780
Gas showrooms ...	15	2,830	3,700	4,780

Employment

Some interesting figures have been included giving the establishments grouped by number of persons engaged for the kind of business carried on. These are included in Table III for three of the four principal electrical categories. As far as electricity showrooms are concerned it is perhaps worthy of note that there are some 86 of these employing 0 to 1 persons. In this connection, however, it should be remembered that employees in showrooms are engaged both in selling of goods and other work. In addition, as the census points out, in some cases separate information was not available for each showroom, but only for a group of showrooms, thus necessitating the equal division of the particulars for the group of showrooms to obtain estimates for each showroom separately.

A further section analyses the trading units in terms of their sales, dividing them into two main classes; organisations with working proprietors, and those without. Here the gross margin is given as a percentage of sales, and also the wages and salaries per year as a percentage of sales and of gross margin. Electricity showrooms have a remarkable advantage in the latter cases, the salaries and wages being only 5·9% of sales and 24·6% of gross margin compared with about 17% for sales and about 54% of gross margin for private enterprise organisations.

Dispersion of sales per person engaged, summarised in total in Table II again shows the commanding position of electricity showrooms, and for direct comparison we have in this case included the figures given for the gas showrooms. These figures are, however, approached by some of the larger units in the radio, electrical good cate-

TABLE I. ESTABLISHMENTS, PERSONS ENGAGED, WAGES AND SALARIES

Kind of Business	Establishments No.	Sales £'000	Persons engaged No.	Wages and salaries per week £'000	Bonuses included in wages and salaries per year £'000
Radio, electrical goods	5,774	57,865	24,816	103	281
Radio, electrical goods with repairs ...	2,366	11,926	8,635	28	34
Electrical goods with contracting ...	1,206	11,775	10,061	43	56
Electricity showrooms	1,107	15,963	5,403	19	*

*Withheld to avoid disclosure.

TABLE III. NUMBER OF PERSONS ENGAGED BY KIND OF BUSINESS

	Radio, electrical goods			Radio, electrical goods with repairs			Electrical goods with contracting		
	Establish-ments	Sales £'000	Persons engaged	Establish-ments	Sales £'000	Persons engaged	Establish-ments	Sales £'000	Persons engaged
Total	5,774	57,865	24,816	2,366	11,926	8,635	1,206	11,775	10,061
Establishments with									
0 or 1 person engaged	1,065	27,513	1,050	580	554	580	34	47	33
2 persons engaged	1,510	6,452	3,008	705	1,266	1,410	113	293	226
3 " "	1,046	7,372	3,132	371	1,278	1,113	171	508	513
4 " "	604	6,104	2,408	226	1,086	904	153	719	612
5– 6 " "	664	9,433	3,585	215	1,543	1,164	204	1,209	1,110
7– 9 " "	438	8,744	3,403	134	1,617	1,055	216	1,854	1,674
10–24 " "	371	11,593	5,230	112	3,065	1,601	264	4,619	3,859
24–49 " "	63	4,145	2,250	} 23	1,515	808	51	2,526	2,034
50 and over " "	13	1,509	750						

gory where those organisations with sales of between £50,000 and £100,000 per annum have figures of £2,220, £3,000 and £4,280 corresponding to those in the table under "sales per person engaged."

In the analysis, however, it becomes evident that it is difficult to isolate completely the sales of a particular commodity. For example, it is shown that electrical and gas appliances are sold by grocers, confectioners, tobacconists and newsagents, women's outfitters, men and women's wear retailers, domestic hardware merchants, chemists, photographers, domestic furniture makers, soft furnishings and floor covering retailers, musical instrument dealers, toy sellers, department stores and builders material merchants. Admittedly such sales are comparatively small, but are none-the-less significant if a true picture is to be obtained.

It should be noted, when considering these figures, that undertakings in the Electricity Supply Industry, and in the Gas Industry, did not make returns of their retailing activities on census of distribution forms. Particulars corresponding to those obtained by means of the census form for retailers were collected as part of the Annual Returns for 1950 made by these undertakings to the Ministry of Fuel and Power under the various Acts. The information incorporated in the Report covers only the sale of goods, mainly appliances and supplies, from the showrooms of these undertakings. Some estimation was, however, required in securing this information, because employees in showrooms are engaged both in the selling of goods and in other work.

The response to the census was fairly high being about 91% of the total number of establishments. In the "hardware group" under which electrical retailers were included the percentage of total sales covered was 92%.

Research in Mechanical Engineering

SUBSTANTIAL progress is claimed in the Report of the Mechanical Engineering Research Board for 1953. The new laboratories, at East Kilbride, are progressing. In the case of the Mechanical Engineering Research Laboratory, the proposals include a building programme for the following major buildings: heat transfer laboratory, mechanisms and metrology laboratory, plasticity laboratory, high temperature creep and fatigue laboratory, and administration building. These buildings are additional to the materials laboratory, which has been in use since 1951 and the hydraulic machinery laboratory due to be finished this year.

By 1959 it is hoped to concentrate practically all the work at East Kilbride, with the exception of lubrication research which will remain at Thorntonhall.

Work in Hand

Comparatively little of the work reported is of direct electrical interest, although indirectly it is of major imporance to manufacturers and designers of electrical plant and equipment. In the hydraulic field attention is being paid to developing a sound design basis for centrifugal pumps. More knowledge is required of the behaviour of an impeller running in a casing, and at East Kilbride attention is particularly directed to conditions in the volute and the effects of impeller/volute interaction.

A major difficulty lies in the acceptance trials of large water-turbines and pumps where measurement of the large water flows are concerned. The use of scale models for this purpose is an attractive proposition, provided "scaling-up" could be carried out accurately. To this end, an analysis of the performance of Kaplan turbines has been undertaken, which has led to the development of a new formula for "scaling-up" the performance of a model. To prove the validity of such a formula, however, full-scale trials of water-turbines will be required and its co-operation with manufacturers and users will be needed.

Problems of lubrication are also under investigation, particularly in the field of high-speed bearings such as are required for gas-turbines. The high rotational speeds involved together with reliability are beyond the capability of ball- and roller-bearings, and attention is again being focused on journal bearings. The results from preliminary tests suggest that for successful operation, the length of high-speed journals should be small in relation to the diameter of the journal. Further, special care should be taken in designing the oil passages by which lubricant is introduced at the unloaded point of the journal. Thrust bearings are also under investigation and at the date of the Report, no new designs have proved better than the Mitchell bearing. New methods of lubricating this bearing are being investigated for the reduction of churning losses particularly by feeding oil directly to grooves in the pads.

Work on electron emission from freshly-worked surfaces has continued with interesting results. With aluminium and zinc an emission peak at a wavelength of 4,700 angstroms was found. The occurrence of a single peak suggests that a definite type of imperfection of the oxide lattice is responsible for the emission and it is suggested that oxygen-ion vacancies act as electron traps. Attention is being given to the consequent deformation of the surface of the metal as a significant factor in bearing design.

Fretting corrosion, a phenomenon well known to shippers of motors with roller or ball-bearings, is also under investigation, and the nature of the wear has been studied under the electron microscope.

The advent of the gas turbine reawakened interest in the steady burning of liquid fuels and a general attack has been started on the problems of combined heat transfer, mass transfer and chemical reaction. Work has also been initiated into the stability of flames which should contribute to the solution of the problem of extinction of flames in gas-turbines and ram jets, particularly at high altitudes.

around the trade

by Peregrin

IN his excellent paper to the British Electrical Power Convention, Mr S. L. M. Barlow mentioned the extensive use of portable tools by electrical contractors in the U.S.A., and this was confirmed in the subsequent discussion. E.C.A. members should of course make every possible use of electric tools, but they can do more than that. They can sell them, for in addition to being a convenient aid to the contractor they can also be a source of profit. There is a tremendous demand for them and they have all the attractions of an electrical retailer's dream, for they are, first and last, an electrical appliance, they carry no purchase tax, they do not deteriorate in stock, they are sold mostly to industrial users, they are not a luxury, are not seasonable and they bring in additional trade in accessories and service, not to mention a possible wiring job.

If the retailer feels that a specialised line like this is beyond him, let him visit the manufacturer's local branch, or, better still, go to his wholesaler. There he will find not only adequate stocks and service facilities, but an explanation and demonstration of all models, from the ubiquitous drill to the garage valve-seat grinder. He will spend an enjoyable hour or so, playing with these ingenious gadgets, and he will probably become an enthusiast, wondering why he did not take them up long ago.

I have said above that portable tools are sold mostly to industrial users. They were, but in recent years the "Utility" tool has been introduced. This is made up in kits, which start with a small electric hand drill and may be enlarged to embrace a saw, lathe, sander, polisher, grinder, and other handy equipment for the amateur workshop. They sell like hot cakes, but some of us in the trade look askance at this modern movement to place a highly industrial appliance with the reach of the do-it-yourself man. Well, the trade is there to be had, and the electrical contractor and retailer should not let it pass him by. If he does, there are many other, perhaps too many, enterprising outlets on the lookout for it.

Hire Purchase Rates

Mr Bellamy's paper, also presented at Eastbourne, included a thought-provoking comment on hire-purchase. He contended that supply authorities cannot afford to regard hire-purchase as a source of separate profit. They have no need to. If the boards would adopt reasonable terms, that is, reasonable to the consumer *and* to the boards, finance houses would clamour for their hire-purchase business. They would gladly relieve the boards of all the trouble, risk, cost and responsibility, for the average buyer of a cooker or refrigerator is a good type and a first-class financial risk.

Mr Bellamy rightly considered that hire-purchase must not be subsidised, at the expense of electricity charges, but that is just what is happening. The present low charges and generous terms offered by the boards amount to subsidising, for every electrical retailer knows that there is a readily calculated figure at which hire-purchase can just make ends meet. The boards, or most of them, work below that figure, which means at a loss.

It may be wise to encourage, by easy terms, the sale of cookers and other current-hungry appliances, but low consumption apparatus such as radio, cleaners and refrigerators should be treated as straightforward, economic profit-making sales, whether for cash or h.p. After all, my garage does not sell me a car at unprofitable terms, on condition that all the petrol for it is purchased from them.

Infra-Red Business

This year's damp and dismal Spring, now ended thank goodness, is said to have created a record. But its unseasonable winds were not ill enough to blow nobody any good, for they helped to create a demand for that aid to animal comfort—the infra-red lamp.

It should not be thought that infra-red lamps are of no interest outside rural districts. Retailers in large towns and industrial areas also can find a ready sale, for even the back yard amateur pig and poultry fancier knows all about farrowing units and chick warmers. But the retailer must keep lamps in stock and not be content to get them "to order," for if the happy event comes sooner than expected the anxious breeder will dash round to the local electrical shop and expect to find farrowing lamps in stock. Wholesalers keep a good stock, for of course infra-red lamps have many varied applications, in addition to assisting nature, and many wholesalers are well equipped for demonstration and advice. But it is for contractors and retailers to keep a good stock and make themselves familiar with the uses of this new source of profit.

Do it Yourself

Recently Mr E. M. Ackery, in his robust letter, challenged my condemnation of the amateur electrician. He concluded by remaining "wholly unrepentant." Well, so am I. My view is that no encouragement should be given to the electrical dabbler but that every possible obstacle should be put in his way, in his own interest as well as for the safety of any possible victim of his misguided efforts. Mr Ackery's comparison with Model Engineer and Handicraft exhibitions, where the amateur craftsman distinguishes himself, does not impress me at all. Playing with toy trains, or making book ends, as a hobby, is one thing. It is quite another thing to play about, in untutored ignorance, with something that can be as lethal as a shotgun or a bottle of poison, when not handled with care and understanding.

Does Mr Ackery carry his "do-it-yourself" creed to its logical extreme? If one of his family needs dental treatment, an operation for appendicitis, or spectacles, does he go to the appropriate practitioner and beg "Give us the information etc.," so that he can do the job himself. No, I believe in employing the skilled tradesman for his proper job and I shall not try to learn how to sole my shoes or paper my ceilings. Finally I recommend Mr Ackery to read the next or any past report on "Fatal Electrical Accidents in the Home," and then Megohm's first paragraph in the ELECTRICAL TIMES for 17th June.

Preventing Peak Power Cuts

EXTENSIVE DIESEL INSTALLATION PROVIDES STANDBY AND EMERGENCY SERVICE

FOLLOWING the power crisis caused by the shortage of coal and generating plant during the winter of 1946-47, the Bristol Aeroplane Company decided that the provision of an independent generating system was desirable as an insurance against the possibility of a future coal crisis, and also to act as a peak demand limiter.

Accordingly, plans were urgently put in hand for the installation of three sets to be located at the Gipsy Patch site in the Engine Division of the company. The availability of plant was at the time extremely difficult, but by arrangement with the Admiralty, three 1,200 kW General Motors/Allis Chalmers sets were made available, these units having originally been ordered up as spares for frigates. Intensive effort ensured that the sets were up and running within five months of the start of the scheme, and the job had been completed by the end of 1947.

Within a few years, however, the pressure of defence programme commitments and, in particular, the expansion of the Company's turbine research programme had doubled the total works load, and it was regarded as desirable that the diesel plant should be extended as well. This development took the form of six 1,064 kW diesel-alternator sets, four to be installed at the Engine Division's East Works in order to back up the Gipsy Patch station, and two to be sited at Filton to serve the Aircraft Division.

Dispersal in this way was necessary for several reasons including works defence requirements, use of existing building and proximity to load centres. Operation of the three stations is, however, controlled from the East Works power station, where a control room has been established and contains all the equipment necessary for the forecasting and control of all electrical power required within the Company.

Close collaboration is maintained between the Company and the South Western Electricity Board as all generation is carried out in parallel with the public supply in accordance with modern practice, and the Board in turn welcomes the provision of this extra capacity as it is available for use at times of peak load, or during emergencies.

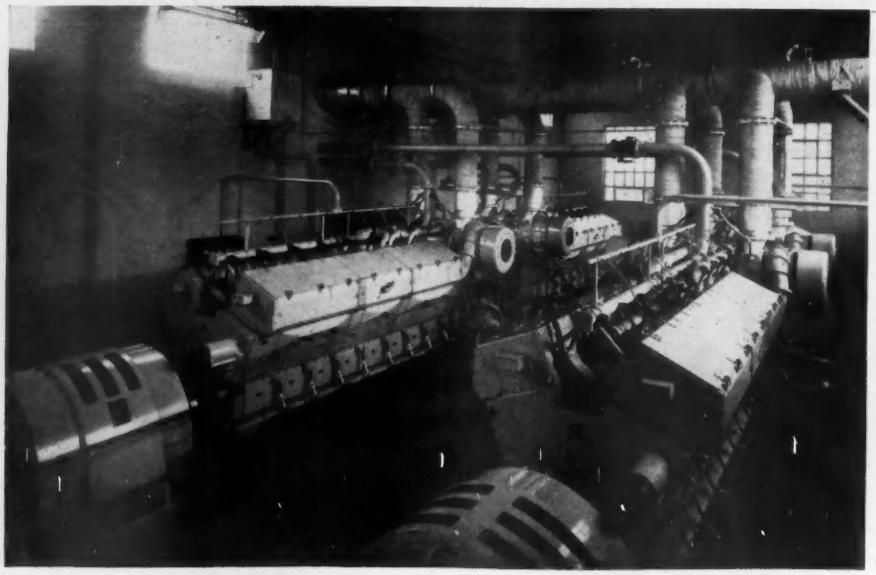
Gipsy Patch

As the sets at Gipsy Patch had to be accepted as they stood, they are d.c. units operating at 500/550 V at 700/750 r.p.m. Being designed originally for marine use the generators, driven by General Motors 16/278A two-stroke uniflow scavenge 16-cylinder diesel engines of 1,700 h.p., are very highly rated and small in size for the output of 1,200 kW. The temperature rise is 70° C above ambient, and to cater for this exceptional figure glass fibre insulation has been used and the heat dissipated by passing cooling air round a closed circuit which includes a water cooler mounted on top of the generator field yoke.

Double pedestal bearings are used, lubrication being provided from the diesel engine lubrication system, and the drive is through a shaft connected to a flexible coupling incorporated in the enclosed engine flywheel. Excitation is provided by individual direct-driven exciters.

In order to utilise these sets, the output from Nos. 1 and 2 is taken to a change-over switching cabinet in the adjacent substation and is fed direct to the d.c. side of a rotary convertor which transforms to 11 kV 50 c/s a.c. It is then switched on to the h.t. distribution network through "C-type" Reyrolle o.c.b. switchgear. The output from the third set is brought direct to the d.c. busbars in the substation and can either be used entirely locally or allowed to be connected to a rotary convertor thus partially exporting at 11 kV a.c.

It is not possible to switch No. 2 set to the local d.c. load, but No. 1 set, by means of a solid link, can be connected to a special 500 V system independent of the main board. Under these conditions it supplies stable d.c. for special test purposes and is used considerably in this manner. Under



General view of the four Mirrlees/Brush JVS 16/1064 kW alternator sets at the East Works power stations

these circumstances, however, the maximum load required by the test plant concerned is only 500 kW.

East Works

In the East Works station are four Mirrlees Bickerton and Day units, each of 1,064 kW capacity. They were installed in 1953, and are 16-cylinder four-stroke diesel engines running at 750 r.p.m. The engines are coupled to salient pole type single pedestal bearing alternators with overhung exciters, the manufacturers being Brush Electrical Co. Voltage of generation is 3·3 kV, the output being stepped up to 11 kV through solidly connected auto-transformers, also made by Brush Electrical Co., and switched on to the 11 kV network through remotely operated Reyrolle "C-type" switchgear.

The four sets are sited in the main hall, back to back in two pairs, so that the control positions are brought together in a centrally disposed walkway. An alarm system offers protection for engine services covering low lubricating oil pressure, failure of water circulation and high water outlet temperature, and these are monitored and registered through pressure relays and thermostats to give audible and visual warning on a control panel. Remote operation push button stations for all pumping services are also situated on this panel, together with the telegraph system of communication with the load control centre.

Each set is controlled from the main load control centre, located in a room arranged at one end of the station about 12 ft above floor level. Here a switch panel contains all the necessary instruments for paralleling, synchronising and remotely closing the oil circuit-breakers. Control of the engine load/speed mechanism, voltage and p.f. rheostat, is also effected from the desk.

The exciter field rheostats, field suppression switches and earthing changeover links are housed in small cabinets, one cabinet containing the equipment for two engines.

Filton Station

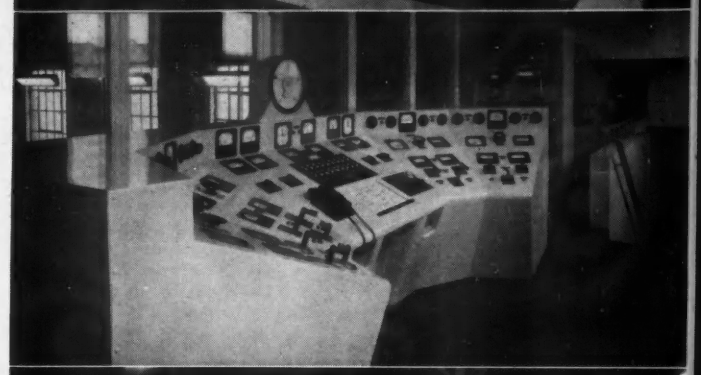
Finally, there is the Filton Station, which is basically a repeat of the East Works layout but contains only two Mirrlees/Brush 1,064 kW sets. Room is, however, available for a further two units if required.

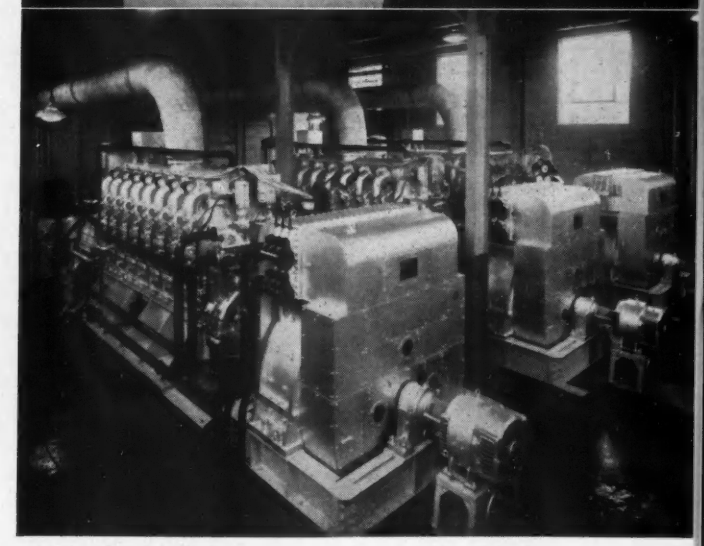
Local control of these units is from a small desk containing similar sets of instruments for each engine. From this desk the synchronising and switching of the two units on to the 11 kV Reyrolle switchboard may be carried out. A small repeater telegraph panel, mounted on the desk, conveys the requirements of the operator at Load Control to the local staff.

House supplies and power for emergency operation of the solenoid-operated o.c.b.s are derived from a radiator-cooled, Paxman-engined, 45 kW self-contained alternator set, and this machine has sufficient capacity to carry the complete services of the power station and adjacent special services in the event of an emergency.

Load Control Centre

The load control centre is, of course, the heart of the system, and at the desk is concentrated all the information covering the loading of the works electrical distribution system. This information indicates to the operator the demands made by various sections of the works, in particular the turbine test department, and enables action to be taken so as to maintain a balanced system and a controlled maximum demand. Power factor correction condensers, recently installed at the various substations to maintain economical use of power, are controlled from this desk, as





Two Blackstone 180 kW alternator sets at Whitchurch power station are seen at the top. These units supply standby power to the engine repair factory

In the centre is a general view of the control desk to show the telegraph system and control instruments. This desk is located at the main load control centre at East Works

The three General Motors/Allis Chalmers 1,200 kW units at Gipsy Patch (bottom) were the first units to be installed

are also the nine diesel sets. A communication system, radiating from this centre, consists of a network of private telephone lines connecting all of the company's h.t. sub-stations and also selected key personnel.

Centrally situated on the desk is a push-button electric telegraph system in communication with the three main generating stations and providing operational information on stopping and starting. This is displayed in the stations by light signals illuminating a lettered glass panel at each of the stations. A large 18 in. diameter dial meter tells the operator at a glance the total maximum demand on the system, and the telegraph panel shows the amount being generated at any given moment.

In addition to the plant described above, there is also a small diesel-engined power house at Bristol's Civil Airport at Whitchurch, where the Company has its engine repair factory. This station contains two Blackstone E.V.4 four-cylinder, four-stroke 180 h.p. engines driving G.E.C. alternators 400/440 V, 180 kW. These machines have a special rating of 10% overload for one hour.

Object of the Scheme

Speaking at a meeting of Press, area board and manufacturers' representatives on the occasion of a recent visit to inspect the plant, Mr A. N. Irens, Chief Electrical Engineer of the Bristol Aeroplane Co., pointed out that the primary purpose of the scheme was to ensure that vital production should not be interrupted. He emphasised, however, that in his opinion it was generally uneconomic for the base load of a factory to be taken by its own plant unless there was a heavy demand for heat for process work. In this particular case the plant installed had been selected primarily on a basis of minimum capital cost as it only operated over a comparatively short period per year.

Apart, however, from the Company's viewpoint, the plant had been useful in aiding the Electricity Board at times of crisis. It had in fact been possible in emergency to run up from cold to 10 MW in a period of 4 to 5 minutes.

In reply to a query as to the decision to install reciprocating engines instead of gas turbines, Mr Irens said that at the time it was made the gas turbine as an industrial unit had not reached a stage of development which was acceptable. The prime cost was a particularly important consideration in plant which was only running for a short proportion of the time.

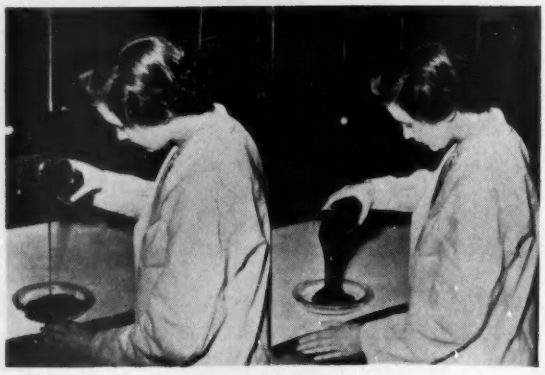
Mr E. C. Willis, manager of the Bristol Sub-Area of the South-Western Electricity Board, confirmed and amplified Mr Irens' comments on the value of this plant to the Board. He referred specifically to one occasion when it was only the pressure of the company's plant that prevented the whole of the domestic load of Bristol being shed. A point of importance was that this plant was instrumental in improving the load factor of the Board and was not being used for base load.

RUBBER IN LIQUID FORM

AN industrial development likely to have considerable application for moulding, insulating and surface protecting applications is the commercial production of depolymerised natural rubber in liquid form. Among its many possibilities is its use as a softener in raw rubber processing, one of its advantages being that, unlike mineral oils and other conventional agents, it is vulcanised into the end-product. Two grades of the liquid rubber, which is manufactured by United Ebonite and Lorival Ltd., are produced—"Lorival 25" having the higher viscosity (25,000 poises) of the two and "Lorival 5" whose viscosity is rated at 5,000 poises. Stated to be capable of being stored for long periods without deterioration, both grades are fluid at room temperature.

For moulding purposes, the rubber is mixed with normal compounding ingredients, to provide a fluid casting material for simple moulds of elastic, soft or hard rubber ("Ebonite") articles. In the finishing materials industries it is eminently suitable as a master-batch medium for paints, dyes and inks whilst it is claimed to impart "cling" to lubricating media and to improve the ability of graphite composition to withstand high pressures. Thinned, sprayed on metal and then stoved, the liquid rubber provides a coating chemically resistant to most corrosion agents. Moreover, when mixed with aluminium paint and similarly treated, the resulting finish is claimed to resist red heat.

The difference in viscosities between Lorival 5 (5,000 poises) on the left and Lorival 25 (25,000 poises) which is shown right, is well demonstrated here



Together with these two rubbers, Lorival are also introducing a range of rubber compounds in liquid form. These bear the designation "Lorival CR" followed by a number which indicates both the type of mix and the characteristics obtainable in the end-product. As all CR compounds contain sulphur and various fillers, they are less stable than the "Lorival R" rubbers, but it is stated that they can be stored, in a cool place, for about six months. Suggested applications for these compounds include that as an adhesive for rubber to metal bonds, anti-static rubber products, corrosion resisting pipe and drum linings, and embedding electrical circuits.

Use as Casting Material

One of its most important uses is that of a fluid casting material. No elaborate mixing plant or moulding presses are required, the selected compound being poured in a mould of wood, plaster, cement or mild steel and vulcanised in an oven at 150° C. The time required for curing depends on the size of moulding and quantity of rubber used, longer times, of course, being necessary at lower temperatures. After a suitable time the product may be removed from the mould and then replaced in the oven to complete curing. In certain cases, the resultant shrinkage in the finished article is stated to be as low as 0·1%, thus enabling the mould to be recharged every few hours. The application of cellulose varnish lacquer or similar material to the faces of moulds of porous substances prevents shrinkage.

Off-Shore Station at Port Augusta

Inauguration of South Australia's New 90 MW Plant

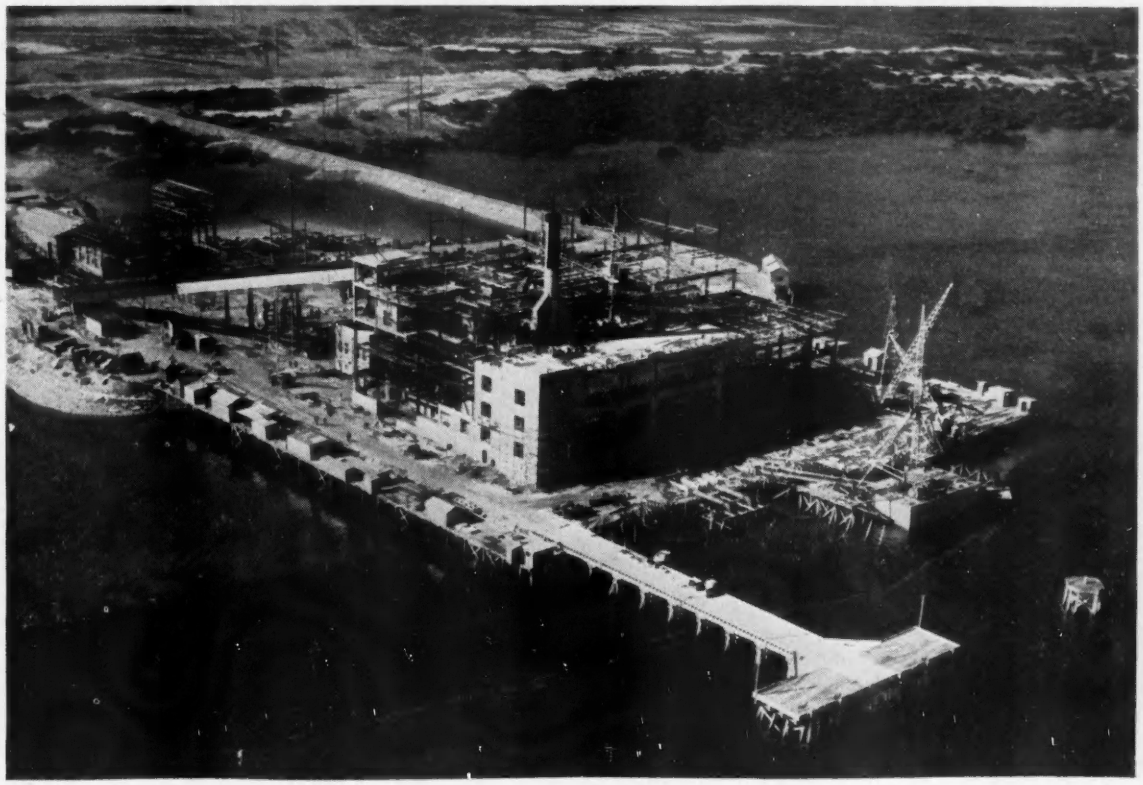
THE official opening of the Port Augusta power station, South Australia, on Friday, 23rd July, by His Excellency, the Governor of South Australia, Sir Robert George, K.C.V.O., K.B.E., C.B., M.C., marks the completion of the first step in a very interesting power project, as well as providing a welcome addition to the State's generating capacity. The station, which now has in operation one 30,000 kW turbo-alternator manufactured by C. A. Parsons and Co., Ltd., is to have three such machines, and six 175 klb/hr boilers supplied by Riley Dodds Australia Pty., Ltd.

Constructed by the Electricity Trust of South Australia at Port Augusta, some two hundred miles north of the main load centre at Adelaide, the station will burn coal produced at the Trust's Leigh Creek coalfield about 150 miles to the north. Port Augusta, on the northern end of Spencer's Gulf, was chosen as a suitable site because it is the nearest place to the Leigh Creek coalfield at which adequate supplies of water are available. It has another advantage in that much of the heavy plant required can be unloaded direct from ships.

The station site itself has been built up on the edge of the deep water channel of Spencer's Gulf. Connecting the site with the shore is a 1¼ mile long causeway across the intervening tidal swampy flat which has very little bearing capacity. It was decided that it would be cheaper to build such a causeway than to pump water to a plant built on land. The causeway has a top width of 50 ft at a level of R.L. 117 ft to give 2 ft clearance above the highest known tide. In the construction of the power station, it was necessary to build a coffer dam 448 ft by 304 ft in extent, and within this area stringy-bark piles were driven. This unusual feature of the project is clearly seen in our photograph below, which was taken last month. The steel framed building itself will be 330 ft by 165 ft, rising to 94 ft above the low water mark, with the top of the chimney stacks rising a further 53 ft above that. The outdoor switching station is situated on the landward side of the plant. From this, two 132 kV transmission lines will supply power to Adelaide and three intermediate substations will tap off along the route.

Coal will be delivered by rail from Leigh Creek, a new line having been constructed for the purpose. Adjacent to the power station is an area to be used to stockpile 60,000 tons of reserve coal. This 90 MW station is scheduled to be completed in 1957. To meet the increasing demand for power, and because of the additional coal deposits located at Leigh Creek coalfield, it has already been decided to construct a further power station with three 60,000 kW generators at Port Augusta. For this, tenders are now being sought by the Electricity Trust of South Australia for the supply of four or five boiler units each of 360 klb/hr capacity and we understand that work is well in hand in the preparation of specifications for the generating plant. Consulting engineers to the Trust for the project are Preece, Cardew and Rider.

An aerial view, taken last month, of Port Augusta 'A' under construction on the edge of the deep water channel



Electronics on show in Manchester

DISPLAY OF EQUIPMENT AT COLLEGE OF TECHNOLOGY

Industrial television used as an aid to training, the picture produced by this Pye camera being watched by students

ONCE a year the North West Branch, Institution of Electronics, stages a small and successful exhibition of electronic equipment at the Manchester College of Technology. This year's event (the ninth) which closed on Tuesday, lived up to the high reputation, established by its predecessors, some 50 organisations having provided a varied and useful display for visiting engineers. Emphasis in the display is placed on equipment designed for industrial and laboratory use, exhibits being divided into three main categories of equipment, instruments and components.

Among the varied electronic equipment, considerable attention was given to television systems designed for industrial and scientific use. In this category was the miniature TV camera produced by Pye Ltd., which has considerable possibilities in these fields. One of its most important uses at present is in technical instruction, relaying pictures over a closed circuit to monitor screens for students. Another closed circuit TV system demonstrated was that of Philips Electrical Ltd. This, which is eminently suitable for observing phenomena likely to be too dangerous for direct observation, operates on a 625 line system for high definition, using a 9 in. monitor screen.

For measurements of minute electrical quantities, Electro-Methods Ltd. displayed a low inertia, integrating motor which comprises a p.m. motor, with a freely suspended armature winding minimising inertia and frictional losses. It has a wide range of linearity which makes it eminently suitable for use in servo applications, whilst other uses include the measurement of X-ray dosage.

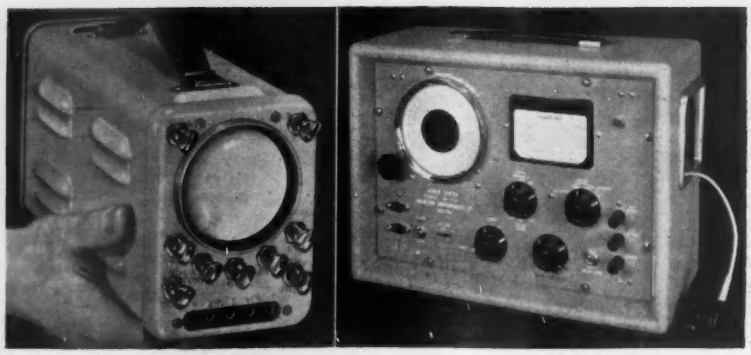
Any exhibition of electronics would be incomplete without reference to its application to industrial control. For motor control, the English Electric Co., Ltd., featured a new electronic unit designed to give speed variation of a 3 h.p. machine over a 20 to one range with constant torque. Further variation over a two to one range, with constant h.p. output is also effected by field weakening. An application of telecommunications to industrial control was shown by Standard Telephones and Cables Ltd. in their acoustic mill feed controller, designed to regulate the feed to ball-type tube grinding mills such as used for pulverising coal. A microphone placed immediately below the mill indicates the quantity of material in a form capable of analysis and of being used for automatic control.

The heading "electronic instruments" covers a wide variety of equipment among which was the recently-developed "slow motion" stroboscope displayed by Dawe Instruments Ltd. Designed for observing components undergoing vibration tests, the equipment provides outputs both for the vibration generator and the stroboscope. The later is triggered at a slightly lower frequency to make the component under test appear to move slowly, thus indicating individual resonances clearly. For testing on site, the portable oscillograph produced by A. C. Cossor Ltd. is a useful waveform indicator, whilst the service engineer was catered for in multi-range portable instruments shown by the Automatic Coil Winder and Electrical Equipment Co., Ltd., and Measuring Instruments (Pullin) Ltd. In the lighting field, Siemens Electric Lamps and Supplies Ltd. displayed a visual colorimeter designed for routine measurement of the chromacity of fluorescent lamps.

Components on show included the newly-developed contact cooled "Westalite" rectifier, a Westinghouse Brake and Signal Co. exhibit, in which the principle of heat conduction has been introduced for cooling selenium-type rectifiers to enable greater compactness to be achieved. Ferranti Ltd. featured a demountable l.v. X-ray tube in which provision is made for rapid replacement of filament target and special polythene window.

For detecting mercury vapour, Hanovia Ltd. displayed a unit for sampling workshop air in a test cylinder along which u.v. light is directed from a low pressure mercury source to a p.e. cell at the other end. The presence of mercury vapour in the test sample reduces the p.e. cell output which is indicated positively on a meter.

Left is shown Cossor's model 1039 M portable oscillograph which uses a 2¾ in. dia. c.r.t., and right, Marconi Instruments' audio tester, having a 50 c/s to 27 kc/s frequency range



POWER SUPPLY Statistics

JUNE

PLANT commissioned by the B.E.A. during June, to the end of the half year, amounted to ten boilers of aggregate evaporative capacity of 3,335 klb/hr and half that number of turbo-alternators, whose total capacity (m.c.r.) is some 255 MW, affecting a dozen generating stations. By comparison with totals recorded for earlier months, the June commissioning is impressive.

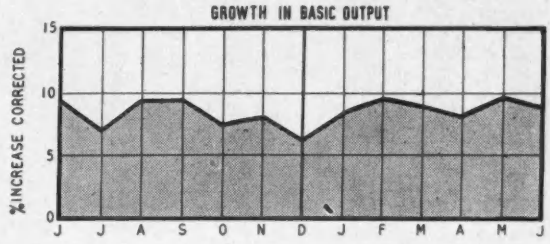
Among the four London Division stations whose plant capacities have been increased is that of Acton Lane B, which records its first commissioning of generating plant. Here, the new plant comprises a 30 MW turbo-alternator, which is of Richardsons, Westgarth manufacture and a 240 klb/hr capacity boiler by Mitchell. Second of the London stations is Barking C, another new station, whose 405 klb/hr boiler—a Babcock and Wilcox unit—is the fourth out of a programme of five such units for this station. Brunswick Wharf is the third to record new plant, both a boiler and turbo-alternator being commissioned. The set, Metropolitan-Vickers manufacture, is its fourth 52·5 MW unit, which completes the programme for this size. The boiler is a 320 klb/hr unit by Clarke, Chapman, the eighth in a programme providing for eleven at completion. Last in the London list comes Deptford East, where another Metropolitan-Vickers 52·5 MW turbo-alternator is recorded.

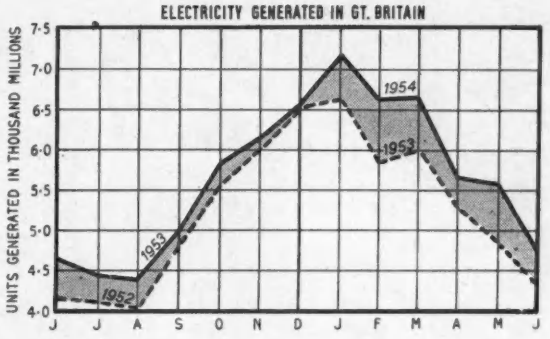
On the south coast, Brighton B station (South Eastern Division) records its sixth boiler. Of Babcock and Wilcox manufacture, this has a 320 klb/hr rating, raising steam at 900 lb/sq in., 900° F (t.s.v.) for 52·5 MW Richardsons, Westgarth sets. In the same Division, at Littlebrook C station, the sixth 360 klb/hr capacity boiler has been commissioned. This is an International Combustion unit, for 60 MW Parsons sets. To the west, East Yelland (South Western Division) records the fifth in a programme of six, 180 klb/hr boilers, which are by John Thompson. In the South Wales Division, a further 360 klb/hr boiler is recorded at Uskmouth. It is a Babcock and Wilcox unit.

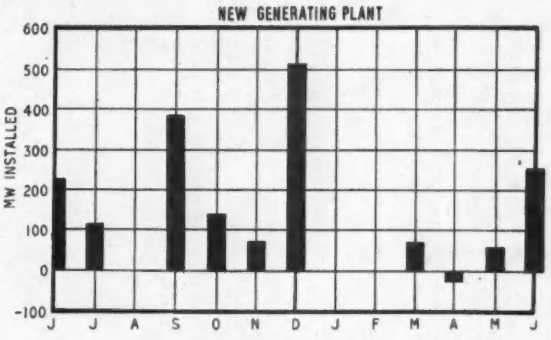
Another new station recording plant is Bold A, in the North West, Merseyside and North Wales Division. Here, the station's second 300 klb/hr boiler of Yarrow manufacture has been commissioned. In the Yorkshire Division, on the coast, Keadby records its fourth boiler and alternator, the former a 550 klb/hr Stirling unit and the latter a 60 MW machine of Parsons manufacture. At Leeds, the three sets so far commissioned at Skelton Grange (also 60 MW Parsons machines) are augmented by a further unit. To complete the list is Braehead station, South West Scotland, where a 300 klb/hr boiler by Babcock and Wilcox brings the total commissioned here to seven.

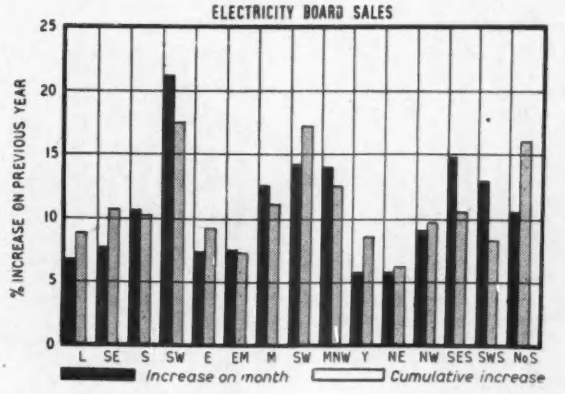
B.E.A. Sales to Area Boards in June

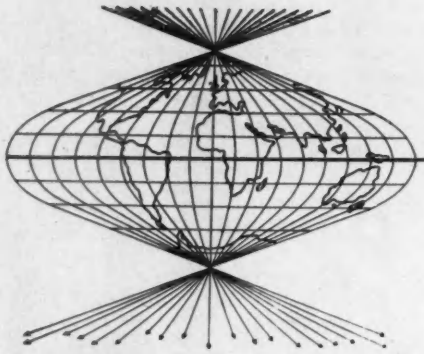
Board	June Sales in million units	% inc. or dec. on June 1953
London	387·5	+ 5·7
South Eastern	240·6	+ 7·7
Southern	293·1	+10·6
South Western	153·8	+21·1
Eastern	399·3	+ 7·4
East Midlands	353·5	+ 7·6
Midlands	478·8	+12·5
South Wales	302·5	+14·2
Merseyside and North Wales ...	282·2	+14·0
Yorkshire	470·1	+ 5·8
North Eastern	281·7	+ 5·8
North Western	520·8	+ 9·1
South East Scotland	101·1	+14·8
South West Scotland	237·5	+12·9
Direct Sales by B.E.A.	94·5	+14·8
Grand Total	4,597·0	+ 9·7











OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

New Scheme for Alberta

The Alberta Government has granted a licence to Calgary Power Ltd, to construct the Pocakerra hydro-electric scheme. The work, which it is hoped will be started within the next few weeks, involves the construction of a dam on the Kananaskis River about 50 miles south-west of Calgary. This will raise the level of the river 39 ft, and provide about 45,000 acre-ft of water storage. Generating plant of 18,500 h.p. is to be installed.

Industrial Power

A 25,000 h.p. hydro-electric plant at Clark City on the Marguerite River, about 400 miles north-east of Montreal, Quebec, was officially inaugurated a few days ago by Premier Duplessis. Output of the plant is being shared by an iron ore company and a pulp and paper concern who have shared the $12 million cost of development.

Line Finance

The Canadian Government is loaning New Brunswick $200,000 to cover the cost of the New Brunswick Electric Power Commission's transmission line to the Army's new Camp Gagetown. The loan is interest free and to be repaid over the next five years; the bill for power used by the Federal Government to be deducted from the loan.

Winnipeg's Problems

If the city of Winnipeg's Pointe du Bois 110,000 h.p. hydro-electric plant is to give dependable service over the next 20 years, the overhaul would cost $5,600,000, according to the report just presented to the City Council by its consulting engineers, H. G. Acres and Co. Alternatives which are suggested are (*a*) rehabilitation of the plant and an additional 34,000 h.p. installed at an estimated cost of $18·1 millions, or (*b*) complete reconstruction of the plant at a cost of $30·8 millions, and, with better use of the flow of the Winnipeg River, providing 160,000 h.p. The Pointe du Bois plant is the farthest upstream hydro-electric development on the Winnipeg River. Much of the plant is old and has given trouble in recent years. The City Council has long been aware that something will have to be done about it. The consulting engineers suggest that a major overhaul could be completed in three years during which time the plant could still operate. But it is unlikely that the Council will make a decision yet awhile for there are other immediate problems to be considered. One of these is the proposal to take a bulk supply from the Manitoba Hydro-Electric Board. The other is whether the city is to take over the distribution network of the Winnipeg Electric Co. within the city boundary.

U.S.A.

Atomic Progress

The United States Atomic Energy Commission has approved a project, estimated to cost about $10 millions, designed as a new step toward perfection of a central station to produce cheap electric power from an atomic furnace. The plant is expected to be in operation about the middle of 1957.

S. AMERICA

Plans Held Up

An investment of 1,500 million pesos has been contemplated by the Mexican Light and Power Co. for expenditure on doubling its generating capacity within the next ten years. But recent events, including devaluation of the peso, have caused the postponement of plans, although the current construction programme is going forward according to schedule and the Patla plant will be put into operation this year. The company is also assisting in a survey being carried out by a special commission of the Mexican Government into the problems relating to the expansion of the country's electricity industry during the next ten years. Officials of the World Bank are participating in this survey, which it is hoped will lay the groundwork for meeting the financial requirements of the industry also.

Electrification in Venezuela

The Venezuelan Development Corporation has now set up a new limited company, with the title of Electricidad de Sucre y Anzoategui, which is to take charge of the electrification of rural districts in those two states. In the national plan of electrification of the whole country special importance is given to the installation of thermal power plants at five sites; but in this latest scheme of rural electrification there may be good opportunities for manufacturers of small generating sets.

NORWAY

Railway Electrification

The first section of the Bergen-Oslo railway to be converted from steam to electricity was declared open earlier this month. The electrified section comprises the 67 miles from Bergen to the winter sports resort of Voss. The authorities hope to electrify the whole of the Bergen-Oslo railway within the next ten years. Altogether 764 miles of railways track operated by the Norwegian State Railways are now electrified, equivalent to 28% of total track. This 28% carries about 50% of the total traffic.

AFRICA

The Volta Scheme

By the end of this year it is expected that most of the technical aspects of the Gold Coast's Volta River aluminium project will have been investigated, according to a statement just issued from Accra by the Government. An essential feature of the project in which British and Canadian aluminium companies are concerned, is a hydro-electric scheme, under which a lake some 2,000 sq miles in extent would be created by damming the Volta River. According to the statement, the many technical investigations being made by the consulting engineers are proceeding satisfactorily. Certain aspects of the scheme will require further and most careful examination. One example is the survey of the area which would be inundated. It is hoped that during 1955 various reports will be made to the government and the aluminium companies covering the scheme in all its implications.

Cable Orders

Cables of the gas pressure type instead of the solid type are to be used for the first time in Cape Town in connection with the development of the municipal transmission and distribution system decided on some months back. The cables are to be 0·15 sq in. 3-core 33-kV feeders from two power stations to two main substations in the suburbs. The cables are to be manufactured by W. T. Glover & Co., Ltd, and will be supplied by a South African firm who quoted £46,122 for 16,000 yards and the necessary joint

boxes, gas feeding cubicles and gas surface boxes. The cost of the cables alone is £39,536. The accepted quotation was the highest of four received for gas pressure cables and it was pointed out, among other things, that the insulation of the Glover cables was much thicker over each conductor than others tendered for and that it was thought to be in the best interests of the Council to obtain this make. The City Council has also placed a contract with W. T. Henleys (S.A.) Telegraph Works Co. for the supply of 33 kV and lower voltage cables and accessories for Salt River No. 2 station, at a price of £189,635.

INDIA

Porcelain Manufacture

The foundation stone for the Indian Government's new porcelain factory at Bangalore, was officially laid earlier this month by the Rajpramukh of Mysore. This development is intended to expand the annual production of porcelain insulators for the electrical industry, etc., from the present 300 tons to about 2,500 tons. The new plant will manufacture Rs. 10 million worth of electro-porcelain goods—including about 650 tons of pin-type insulators, 1,400 tons of suspension insulators, 150 tons of pot-type insulators and 300 tons of other tube insulators for transformers and allied industries. The new factory has been planned with the technical collaboration of a Japanese concern, Nippon Gaisha Kaisha.

MALAYA

New Penang Station

Negotiations have been completed by the English Electric Co., Ltd., with Preece Cardew and Rider, consulting engineers, acting on behalf of the Municipal Council of Georgetown, Penang, Malaya, for the supply of two 10,000 kW, 11 kV turbo-alternator sets, designed to operate at 40 p.s.i., 800° F, with condensers and feed-heating equipment. These sets are for the new power station, to be constructed on Penang Island, plans for which were referred to on 12 Nov. 1953. An order has also been placed with Foster Wheeler Ltd for two 130 klb/hr boilers. As we earlier stated, when this new power station comes into operation, probably early in 1957, it will replace the Municipality's old power station at Prai, on the mainland. But in the meantime, to assist in meeting the demand, two diesel generating sets are being supplied by Harland & Wolff Ltd. According to present plans it is anticipated that the new Penang power station will be extended at a later date, probably by the installation of three more turbo-alternators, we understand.

AUSTRALIA

Demand in Brisbane

With the demand of consumers continually increasing, Brisbane City Council will have to pay about £206,000 for its bulk supply from the Southern Electric Authority of Queensland during the current financial year, according to Alderman Coutts, chairman of the Transport and Electricity Committee. The corresponding figure for the year 1953-54 was £85,000. The higher figure, however, includes £106,000 as a contribution towards capital expenditure. The Council's own generating plant now has a total installed capacity of 85 MW, but it is expected that the maximum demand this winter will reach 122 MW, leaving a balance of 37 MW to be carried by the S.E.A. It is likely that by the winter of 1955 the Council will have the first 30 MW set running at the Tennyson power station, but the demand is expected to reach 134 MW, leaving a deficiency of 19 MW. But by the winter of 1956 the Council's expanding capacity should meet the demand. Alderman Coutts said the Council was negotiating a new agreement with the State Electricity Commission and the Southern Electric Authority on interconnection of power supplies. The existing 15-years agreement expired last month. The new agreement would require a number of changes due to different conditions, but there would be no change of its general purpose to supply electricity from one authority to the other for meeting emergencies.

NEW ZEALAND

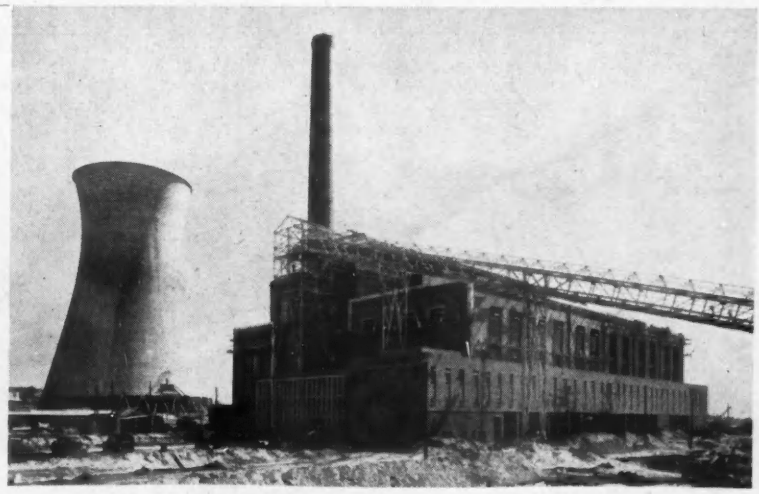
Domestic Electrification

In New Zealand, 52·19% of the domestic consumers had electric cookers at the end of March, 1953, according to the annual statistics just issued by the State Hydro-Electric Department. The percentage of consumers with electric water heaters was 51·8%. In number, there were 278,444 electric cookers and 322,432 water heaters installed. During the twelve months covered by the report there were 22,873 electric cookers and 22,004 water heaters connected to the mains. The statistics show that at 31 Mar., 1953, there were 622,439 consumers connected, there being 22,938 added during the period. The total number of units sold amounted to 2,841·4 millions, the average consumption per consumer being 4,565 units, which figure is only 6 higher than for the previous year. The average revenue from the retail sale of electricity was 0·894d. per unit.

Of the electricity undertakings operated by City Councils, Christchurch, had the largest number of consumers—52,569, of whom over 60% had electric water heaters, and 68·5% had electric cookers. Domestic electrification is also well advanced in New Plymouth where of the 9,858 consumers over 67% have electric water heaters and about 66% electric cookers installed.

Many of the forty-three Power Boards listed have comparable percentage figures. The largest, Auckland Electric Power Board, with an area population of over 291,000 had 93,392 consumers (78,424 domestic), with 45,360 cookers and 51,720 water heaters connected to the system, but some of the smaller Boards had figures equally as good. The Te Awamutu Board, for example, had 3,740 domestic consumers, of whom over 81% had cookers and 67% water heaters.

On the generation side, the statistics show an increase of 85,896 kW in a total generating capacity of 701,977 kW at 31 Mar., 1953. Hydro plant generated 3,334·4 million units, steam plant provided a further 220·6 million units, and oil engine generators 23·9 million units.



The first 30 MW turbo-alternator was put into service a few weeks ago at the Umgeni power station of the Electricity Supply Commission of South Africa, shown here. Situated at Pinetown, 10 miles north-west of Durban, in Natal, the station is initially to have two such sets and four 180 klb/hr boilers. The second set is in course of manufacture and will be installed early in 1955. The turbo-alternators, being supplied by British Thomson-Houston Co., operate with steam at 600 lb/ sq in., 850° F, and exhaust against an absolute back pressure of 2" Hg. at the economical load of 24 MW, the circulating water temperature being 80° F. Four-stage feed heating is incorporated, giving a final feed temperature of 356° at maximum load. Bled steam is not used for evaporating purposes as central evaporative plant is installed using high-pressure steam. The boilers are being supplied by International Combustion Ltd., to whom we are indebted for the photograph. Melesco superheaters are installed. The station is designed to be capable of extension by a further twelve boilers and six turbo-alternators similar to those in the first stage

Personalities

IN THE INDUSTRY

Councillor L. Wall, Birmingham manager of Electrical Components Ltd., has been appointed to represent Sutton Coldfield Borough Council on the Electricity Consultative Council No. 4 (Birmingham and District) Local Committee, for the ensuing municipal year.

Mr C. U. Magnusson has been appointed joint managing director of the Skefko Ball Bearing Co., Ltd. **Mr G. A. R. Mead** continues as a joint managing director of the company. **Mr W. Siberg** has retired from the position of joint managing director of the company but is retaining his seat on the Board.

Mr R. S. Maunder, M.I.E.E., M.N.Z.I.E., manager of the City of Wellington (New Zealand) Electricity Department, who is on a visit to Britain, is expected to return to the Dominion at the end of this week.

Changes in the organisation of the department of the chief electrical engineer are announced by London Transport. **Mr L. A. M. Ginger,** A.M.I.E.E., has been appointed assistant chief electrical engineer, and **Mr H. Branton,** formerly generation station superintendent at Lots Rd, is appointed assistant electrical engineer (generation) with responsibility for work in connection with all three of London Transport's power stations at Lots Rd, Neasden and Greenwich. Prior to joining London Transport, Mr Ginger was assistant for substations and cables in the office of the electrical engineer (new works and development), Railway Excutive, and was largely responsible for the design and layout of the substations and distribution systems for the Liverpool St to Shenfield and the Manchester, Sheffield and Wath electrification schemes. In 1950 he was appointed assistant electrical engineer (outdoor), with responsibility for the co-ordination of the operation and maintenance of the generating stations, substations, h.t. mains and distribution sections of London's electric power supply system. Mr. Branton joined the Metropolitan Railway in 1930 as assistant resident engineer at Neasden, becoming resident engineer three years later, and assistant electrical engineer in charge of the generating station in 1940—a position re-designated generating station superintendent in 1950. In 1951 Mr Branton was appointed generating station superintendent at Lots Rd.

We offer our congratulations to **Mr Geoffrey F. Kennedy,** M.A., M.I.MECH.E., M.I.E.E., (partner in the consulting engineer firm of Kennedy and Donkin), whose wife, Daphne, presented him with a son on Thursday last.

Lord Simon of Wythenshawe has been appointed president of Simon-Carves Ltd., having relinquished the office of governing director.

Mr D. G. Lindsay, A.M.I.E.E., of Alexander Lindsay Ltd., now represents the Electrical Contractors Association of Scotland on the Electrical Fair Trading Council, in place of **Mr J. D. D. Shaw.**

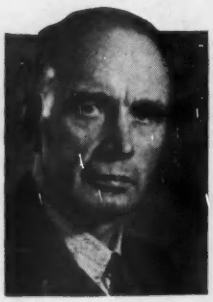
Mr I. S. G. Mackenzie, M.B.E., has been appointed to the new post of Director of Labour and Welfare of the North West, Merseyside and North Wales Division of the British Electricity Authority, and it is anticipated that he will take up his new duties on 1 Sept. He has, since 1949, been secretary to the Midlands and East Midlands District Joint Advisory Councils of the Industry. Educated at Kings Mead, Seaford, and Trent College, Derbyshire, Mr Mackenzie was for 10 years with the Eastern Telegraph Co., Ltd. (now Cable and Wireless). After passing through workshop and operating training, he served first on the technical and then on the administrative staff; his work included the initiation and running of the Training School. War service interrupted Mr Mackenzie's appointment as Office Manager for the Imperial Tobacco Company Ltd., in London, but on demobilisation he was made personnel manager of their Liverpool factory. He served with the Royal Corps of Signals from August 1939 to August 1945, and was awarded the M.B.E. (Military) in 1944.

We are now able to reproduce below the photograph of **Mr J. C. Duckworth,** B.A., who, as we reported last week, has been appointed as nuclear power engineer to the British Electricity Authority. He is to organise and lead a new branch of the B.E.A.'s Chief Engineer's Department which will be engaged on the design, construction and operation of nuclear power stations. Since early in 1950, Mr Duckworth has been chief engineer of the Ferranti Laboratories at Wythenshawe.

Mr L. Tennant, of Pontefract, has been appointed chief assistant electrical and mechanical engineer at Scarborough Corporation in succession to **Mr F. J. Listed,** who is shortly retiring.

Mr W. B. Laing, M.I.E.E., general manager of Bruce Peebles and Co., Ltd., and **Sir William Paterson,** chairman and managing director of the Paterson Engineering Co., Ltd., have been awarded Honorary Fellowships of the Heriot-Watt College, Edinburgh.

President-elect of the London branch of the Association of Mining, Electrical and Mechanical Engineers is **Mr C. A. C. Hillyer,** who is a member of the engineering staff at the Willesden Switchgear works of the British Thomson-Houston Co., Ltd. He takes up office in October. Mr Hillyer served his apprenticeship with B.T.H. from 1919 to 1924 and, apart from three years with Johnson and Phillips at Charlton (1925/28), has been with the company at Willesden ever since, taking charge of mining and flameproof switchgear design in 1935 and being responsible for heavy metalclad switchgear development since 1946. Keenly interested in the



Mr L. A. M. Ginger

Mr H. Branton

Mr I. S. G. Mackenzie

Mr J. C. Duckworth

Mr C. A. C. Hillyer

application of switchgear in mines, he has several times lectured on different aspects of this subject, and has been a member of the A.M.E.M.E. since 1945 and a committee member of the London Branch since 1949.

Previously deputy chairman, **Mr E. Cassleton Elliott,** F.S.A.A., has been appointed chairman of Kerry's (Gt. Britain) Ltd. and its subsidiaries in succession to the late Mr E. P. Richardson, F.C.A.

The board of Hoover Ltd. announce that they have appointed **Mr S. Roberts,** F.I.S.M.A., to be deputy managing director and general sales manager of the company with immediate effect. Mr Roberts was appointed a director of the company at a board meeting last Thursday. Trained as an engineer, Mr Roberts joined Hoover's in 1929 as a representative, since when he has served in every position in the sales organisation. Since he was appointed a director of Hoover (Washing Machines) Ltd. in 1950, he has been responsible for the company's sales policy, which has resulted in the very large increase in turnover in recent years. Mr Roberts' appointment followed the resignation of **Mr F. H. Bunn,** who has retired after 33 years' service with the company. Mr Bunn has been director and general sales manager of Hoover Ltd. since 1946.

With regard to our note last week concerning the appointment of **Mr J. B. Taylor,** T.D., as managing director of the British General Electric Co. (Canadian) Ltd., by an unfortunate mistake the wrong photograph was supplied to us to accompany the paragraph. The picture printed last week was of **Mr A. I. F. Simpson,** senior engineer with the G.E.C. at Allesley, Coventry, who was awarded the M.B.E. in the Queen's Birthday Honours recently. We now reproduce below the photograph of Mr J. B. Taylor and regret any inconvenience caused to either gentleman.

Mr O. D. Angell, senior partner of Belisha and Co., stockbrokers, has joined the board of the British Vacuum Cleaner and Engineering Co., Ltd.

Mr George Ellison, (founder and chairman of George Ellison Ltd.) and Mrs Ellison, yesterday, 21 July, celebrated in Switzerland the diamond anniversary of their wedding. Mr Ellison is, of course, also chairman of the associated companies, Tufnol Ltd, and Alfred Ellison Ltd. Mr Ellison comes from Cheshire, but his wife is Swiss. They were married in U.S.A., and have four sons and one daughter. Three of the sons assist Mr Ellison in the governing of the Ellison associated companies. Mr Ellison can claim to be a pioneer of the Electrical Engineering Industry, for as long ago as 1898 he was producing switchgear in Paris. In fact he has been referred to as the father of the French Switchgear Industry. The British firm of George Ellison Ltd. was founded by Mr Ellison in 1906, and in 1929 he founded Tufnol Ltd. under its former name of Ellison Insulations Ltd. His numerous friends in the industry will offer congratulations and best wishes to Mr and Mrs Ellison.

Mr and Mrs George Ellison in Switzerland

At the E. K. Cole presentation of long-service awards

The newly elected president of the Scientific Instrument Manufacturers Association for the 1954-55 session is **Mr C. E. T. Cridland,** A.M.I.E.E., chairman and managing director of a group of companies including Aldis Bros. Ltd. Mr Cridland was educated at Trent College, Long Eaton, and took his electrical diploma at Faraday Hse Engineering College, London. After gaining early practical training with Fielding and Platt Ltd., and the Bristol Corporation electricity works, he joined an electric motor manufacturer in Leeds and subsequently spent a period in London. Afterwards, he commenced one of the early wireless manufacturing concerns, but in 1923 moved to Birmingham where he became interested in various engineering firms. In 1937 he became founder and managing director of Eclair Doors Ltd. He acquired the share capital of Aldis Bros. Ltd. in 1946, and of Aero Heat Treatments in 1947. Last year he formed Portable Balers Ltd., of which he is chairman and managing director.

On Wednesday of last week, **Mr E. K. Cole,** chairman and managing director of E. K. Cole Ltd., presented gold watches to **Mr A. C. Segger** and **Mr C. R. Godshill,** production manager and assembly superintendent, respectively, of the firm's Southend radio factory, and **Mr A. P. Impey,** a senior wage clerk, to mark their 25 years association with the company. Our accompanying photograph taken on the occasion shows left to right, Mr A. P. Impey, Mr E. K. Cole, Mr A. C. Segger and Mr C. R. Godshill.

Appointed as transmission design engineer to the British Electricity Authority is **Mr W. Casson,** M.I.E.E., formerly system design and development engineer at the Authority's headquarters. He succeeds **Mr F. J. Lane,** O.B.E., M.SC., M.I.E.E., who was recently appointed deputy chief engineer (transmission). Prior to the end of 1952, Mr. Casson had been technical engineer with the Eastern Division since 1948. He served his apprenticeship with the Blackpool Corporation undertaking and then joined Met-Vickers as meter, instrument and relay test assistant. In 1930, as outside testing and commissioning engineer with Kennedy & Donkin, he was associated with the construction of the grid in Central Scotland and North West England. In 1934 he became senior engineer in the Technical Department of the S.E. England District of the C.E.B., and was subsequently promoted to chief assistant technical engineer.

Mr J. B. Taylor

Mr C. E. T. Cridland

Mr W. Casson

Press officer with E.M.I. for several years, **Mr P. O. Wymer,** B.SC., A.M.BRIT.I.R.E., has been appointed press officer in the Publicity Division of Mullard Ltd. His successor as press officer with the E.M.I. group is **Mr H. John Dyer.**

Mr Frank Foulkes, president of the Electrical Trades Union, has been re-elected to that office unopposed for a further term of five years after his present term ends next year.

As we briefly noted last week, **Mr L. C. Jarman,** A.M.I.E.E., A.M.I.PROD.E., has joined Metal Industries Ltd., as group personnel officer. As such he will be responsible for training, education and welfare work for all the companies in the Electrical, Engineering and Metals Divisions of the Group. Prior to this appointment, Mr. Jarman held similar positions with the Merseyside and North Wales Electricity Board and with Richard Thomas and Baldwins Ltd., and, prior to the war, was on the technical staff of Brookhirst Switchgear Ltd., one of the Metal Industries Group of Companies.

OBITUARY

Mr C. B. Collins, an executive director of the British Vacuum Cleaner and Engineering Co. Ltd., has died. He served with the company since 1912.

The death is reported on 18 July in Ontario, of **Mr John Hawkins,** A.M.I E.E., aged 39.

Mr Thomas F. Lister, chairman of Hackbridge and Hewittic Electric Co., Ltd., died on 13 July, aged 71. Well-known throughout the industry—he was also chairman of the B. E. A. M. A. Council from 1951 to 1953 — he will be greatly missed by a wide circle of friends. Mr T. F. Lister was born in Brighouse and educated at the Halifax Technical School. After spending about three years with a small engineering firm in Yorkshire, he joined Ferranti Ltd. in 1901 and, following a period of only a few months at Hollinwood, was transferred to the Contracts Department of the London office. This office was closed down in 1904, and he then joined the General Electric Co., Ltd., at Queen Victoria St, for a few months. In 1905 Mr Lister went to Metropolitan-Vickers Electrical Co., Ltd. (then British Westinghouse), where he remained for twenty years. During this time he gained valuable experience in the Large Machine Division, Switchgear, Transformer, and Meter Departments and, during the First World War, had charge of the Deep-Sea Mining and the Magneto Departments. After the 1914-18 war, Sir Holberry Mensforth started a Main Production Department covering the whole of the Trafford Park Works and Mr Lister was appointed first superintendent, a position he occupied until 1925, when he left Trafford Park to take up the position of manager of the Hackbridge Electric Construction Co., Ltd. In 1926 he was appointed manager also to the Hewittic Electric Co., Ltd., which had been acquired by the Hackbridge Co.; he became director of both companies in 1931; managing director of those concerns and the New Switchgear Construction Co., Ltd., in 1944. He was appointed chairman and managing director in 1946, and the following year became chairman and managing director of the newly amalgamated group, the Hackbridge and Hewittic Electric Co., Ltd. He relinquished the post of managing director last March.

Mr T. F. Lister

Sir Ernest Willoughby Petter, founder with his brother, Mr. P. W. Petter, of the engineering firm at Yeovil bearing the family name, died on 18 July, aged 81. He was president of the British Engineers Association from 1923 to 1925; a member of the executive of the Federation of British Industries, and a vice-president of the Institution of Mechanical Engineers.

Mr A. E. Erickson, mining superintendent of the Home Sales Department of Automatic Telephone and Electric Co., Ltd., died on 8 July, aged 56.

I.E.E. COUNCIL AND CHAIRMEN

THE Institution of Electrical Engineers have announced the constitution of the Council, the various sections, committees and the names of the chairmen of the local centres for the session commencing 30 Sept. next. The constitution of the Council for the next session will be as follows:

President: *J. Eccles,* C.B.E., B.SC., with the past-presidents.

Vice-Presidents: *T. E. Goldup,* C.B.E.; *S. E. Goodall,* M.SC. (ENG.); *Willis Jackson,* D.SC., D.PHIL., F.R.S.; *Sir George H. Nelson;* and *Sir Gordon Radley,* C.B.E., PH.D. (ENG.).

Honorary Treasurer: *H. W. Grimmitt.*

The Council have co-opted Mr B. Donkin, B.A. (Member) to fill the casual vacancy created by the election of Dr Willis Jackson, D.SC., F.R.S., as a Vice-President before the completion of his term of office as an Ordinary Member of Council.

Ordinary Members of the Council:

Members: *A. R. Cooper; C. Dannatt,* O.B.E., D.SC.; *B. Donkin,* B.A.; *O. W. Humphreys,* B.SC.; *F. J. Lane,* O.B.E., M.SC.; *G. S. C. Lucas,* O.B.E.; *Sir Hamish D. MacLaren,* K.B.E., C.B., D.F.C., LL.D., B.S.C.; *A. H. Mumford,* O.B.E., B.SC.(ENG.); *W. F. Parker; Professor M. G. Say,* PH.D., M.SC.; *R. L. Smith-Rose,* C.B.E., D.SC., PH.D.; *G. O. Watson; E. L. E. Wheatcroft,* M.A.; and *R. T. B. Wynn,* C.B.E., M.A.

Associate Members: *A. T. Crawford,* B.SC.; *H. R. L. Lamont,* PH.D., M.A., B.SC.; *G. Lyon,* M.SC.(ENG.); and *J. H. Westcott,* B.SC.(ENG.), PH.D.

Companion: *C. R. King,* C.B.E.

Associate: *J. Bennett.*

Chairmen and Past-Chairmen of Sections: *J. I. Bernard,* B.SC.TECH.; *L. G. Brazier,* PH.D., B.SC.; *J. F. Coales,* O.B.E., M.A.; *C. W. Oatley,* M.A., M.SC.; *J. D. Peattie,* B.SC.; *B. L. Metcalf,* B.SC.(ENG.); *J. A. Smale,* C.B.E., B.SC., and *M. Whitehead.*

The **Chairmen of Local Centres** for the next session are: *Major P. L. Barker,* R.E.M.E., B.SC. (Northern Ireland); *A. R. Blandford* (South Midland); *E. Bradshaw,* M.B.E., M.SC.TECH., PH.D. (North-Western); *W. A. Crocker* (North Midland); *P. R. Dunn,* B.SC. (Mersey and North Wales); *J. S. Hastie,* B.SC.(ENG.) (Scottish); *A. N. Irens* (Western); *E. A. Logan,* M.SC. (Southern); *G. W. B. Mitchell,* B.A. (North-Eastern); and *J. H. Mitchell,* B.SC., PH.D. (East Midland).

Sections: The Measurements Section Committee officers are: Chairman, *M. Whitehead;* Vice-Chairman: *Denis Taylor,* M.SC., PH.D.; Ordinary Members elected being *Professor F. Brailsford,* PH.D., B.SC.(ENG.); *M. Kaufmann; C. Ryder; Professor A. Tustin,* M.SC., and *P. Vigoureux,* D.SC.(ENG.).

The **Radio Section Committee** consists of, Chairman: *C. W. Oatley,* M.A., M.SC.; Vice-Chairman: *R. C. G. Williams,* PH.D., B.SC.(ENG.); Ordinary Members elected being: *N. C. Robertson,* C.M.G., M.B.E.; *L. Rushforth,* M.B.E., B.SC.; *A. M. Thornton,* B.SC. The Committee have co-opted Mr B. N. MacLarty, O.B.E., to fill the casual vacancy created by the election of Dr. R. C. G. Williams, B.SC.(ENG.), as Vice-Chairman before the completion of his term of office as an ordinary member of committee.

For the **Supply Section Committee,** the new Chairman is *J. D. Peattie,* B.SC.; the Vice-Chairmen *L. Drucquer* and *Professor M. G. Say,* PH.D., M.SC., and the new ordinary members of Committee: *H. G. Bell,* M.S.C.TECH.; *L. Gosland,* B.SC.; *L. C. Richards,* B.SC.TECH.; and *L. H. Welch,* B.SC.(ENG.).

The **Utilisation Section Committee** is to have as its Chairman, *J. I. Bernard,* B.SC.TECH., the Vice-Chairmen being *H. J. Gibson,* B.SC., and *D. B. Hogg,* M.B.E., T.D.; and the new ordinary members of Committee, *G. H. Davidson, P. T. Fletcher,* B.SC.(ENG.); *A. H. McQueen,* and *R. A. Marryat,* B.SC.(ENG.). The Committee have co-opted Mr R. H. M. Barkham, B.SC.(ENG.) to fill the casual vacancy created by the election of Mr D. B. Hogg as Vice-Chairman before the completion of his term as an ordinary member.

PROBLEMS AND PRACTICE

In Engineering

Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

Starter Troubles

WHEN called to a printing works recently I was confronted with a series of faults which seemed confusing to say the least. The information I was given by a machine operator was that at 5.15 p.m. on the last two evenings the fuses of a 7·5 h.p., d.c. motor driving a line shaft had blown for no apparent reason. On the first occasion the fuses were replaced and everything appeared in order. The following evening the fuses were replaced as before and the motor was restarted and ran normally.

Next morning, however, it was noticed that a 3 h.p. motor driving a hoist in the same room showed no signs of life when attempts were made to start up, whilst the 7·5 h.p. motor was running satisfactorily. To add to the confusion the operator assured me that at the time of the fuses blowing each evening his own machine, which was driven by its own separate motor, showed a brief but considerable increase in speed.

As the hoist was most urgently required this fault was tackled first and was soon located to a fuse carrier not making proper contact in its base. The two circuits in question were fed from the same 2-way d.p. fuse board and apparently the fuses of the hoist circuit had been removed when repairing the motor fuses and were not properly replaced.

Upon investigating the circuit of the 7·5 h.p. motor it was noticed that a flash-over had been occurring between the contacts of the faceplate starter and the frame, and this had caused the fuses to blow. Also a piece of resistance wire had been connected in parallel with the no-volt coil and I was later told that the purpose of this was to attempt to decrease the motor speed, complaints having been received that the driven machines were running too fast. This connection evidently so reduced the strength of the no-volt electro-magnet that the pull of the return spring was only just overcome.

It came to light during conversation with one of the employees that work on the next floor down ceased just after 5 p.m., and I assume that around 5.15 p.m. some vibration was caused from downstairs, probably due to the slamming of a door, resulting in the no-volt magnet releasing the starter arm without the main switch being opened. Evidently the arcing occurring at the starter due to shunt discharge from the field circuit of the 7·5 h.p. motor was sufficient to cause the previously mentioned flash-over to earth and consequent fuse blowing.

Regarding the momentary increase in speed of another machine I can only assume that this was occasioned in some way by the shunt discharge voltage.

I would close by saying that the resistance wire was immediately removed from the starter, now more than one week ago, and no further complaints have been received regarding the job.—*P. K. S.*

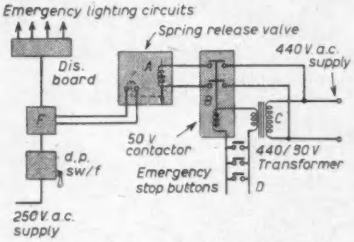
Shorted Turns

AN unusual fault occurred on the instrument panel of a 7·5 MW alternator. The panel consists of the usual ammeter, kW meter, p.f. meter and watt-hr meter, the same set of current transformers being used for all current coils of above instruments. The first indication of the fault occurred when a switchboard attendant reported a discrepancy between the watt-hr. meter readings and the indicated kW. No further reports were received until a few days later when a 150 kW reading was noticed on the meter with machine shut down. The machine was required before the meter could be removed, so the following day an intermittent 150 kW swing developed on kW meter with a swing also noticeable on ammeter readings. The machine was shut down, and the kW meter removed, and on test it was discovered that one of the potential coils had broken down between turns thus giving the effect of a current and potential winding, the fluctuations being caused by intermittent contact of shorted turns.—*W. D. Orr (S.A.).*

Emergency Operation

DURING a recent installation in a large textile factory, the management proposed that an emergency system be devised and installed to provide means of shutting down the plant in the event of fire or similar circumstances. Two large alternators, driven separately from a large steam engine, supplied the factory lighting, heating, and power in the form of a number of large h.p. electric motors driving multiple line shafts, whilst certain parts of the factory were still running on direct mechanical drive from the engine. This meant that the application of a complete shut down mechanism would require to be on the mechanical drive rather than on the electrical system as is usually the case, but fortunately the engine had already been provided with a mechanical trip lock controlling a spring loaded main inlet valve to the engine. After a number of calculations and experiments it was decided to fit a coil and moving core solenoid to operate at 440 V a.c. supplied by the alternators, this solenoid core being mechanically attached to the valve trip lock arm. Since the method of coil energising was to be by a number of the breakable glass, self-closing type, emergency switches it was necessary to operate these at a lower voltage for safety, and a 440/50 V step down transformer was fitted for the push circuit. To connect with the valve solenoid it was therefore necessary to include a contactor with 50 V coil and the final arrangement was as shown in the sketch with solenoid coil (*A*), contactor (*B*), transformer (*C*), and emergency stops (*D*). Thus current would be supplied to the emergency circuit as long as the alternators were running, but on closing any emergency stop push by breaking the glass the 50 V contactor would close and solenoid *A* would withdraw the trip release bar, allowing the spring loaded inlet valve to close and shut down all power. By test it was found that complete shut down could be effected in a matter of minutes.

At this point it was appreciated that failure of supply would cut off all artificial lighting and consequently a system of lighting points at strategic positions throughout the factory was installed. The question of supply for this system was solved by a special arrangement with the local supply authority to connect a main supply for the emergency lighting, in preference to a battery system. The main supply was brought through a switch fuse (*E*) then a contactor panel (*F*) and



Schematic diagram of the emergency shut down and lighting system

fuseboard (*G*). The coil of contactor was energised by closure of a mercury switch (*H*) which was attached to the trip bar mechanism of the inlet valve and set to operate on release of this bar, so that connection of emergency lighting was almost instantaneous with stoppage of plant. Although this system may not have a technically streamlined design, it adequately fulfils the purpose required, and many similar situations could be improved by application of the principles involved.—*J. T. R.*

Equipment for Industry

•

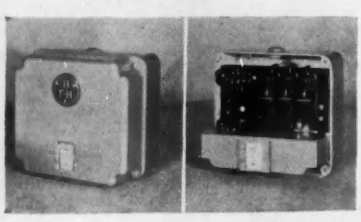
Counting Electronically

TWO new electronic counting instruments, which have been specially designed for use in arduous conditions, have been introduced by AIRMEC LTD., High Wycombe, Bucks. Depending for their operation on the interruption of a beam of light to a photoelectric cell they can handle up to 3,000 articles per second. The first instrument, type N.851, is a counting machine only, whilst the second, type N.808 is a batch counter arranged to count in tens, twelves, sixteens or at any multiple of these figures; it can be used for applications such as cutting material into exact lengths, or controlling the packing of articles. Both instruments are contained in robust cases and may be operated from a supply of 100-130 volts or 200-250 volts 50/60 c/s. Normal consumption is 120 watts.

Overhead Crane Protection

A BREAKAGE in any of the bare conductor rails, which supply the power to an overhead crane, may cause considerable damage to personnel or equipment. Designed to obviate the source of danger, a new equipment produced by the BRITISH THOMSON-HOUSTON CO., LTD., Rugby, relies for its operation on the unbalanced current that flows between the neutral points of two star-connected balanced resistor networks connected at each end of the conductor rails. This current when rectified is fed into a sensitive relay, the contacts of which, being connected in series with the undervoltage coil of the circuit-breaker, trips out the supply. The whole equipment is contained in two robust die-cast boxes each measuring 7 in. by 7½ in. by 5 in. deep. A switch which simulates fault conditions is included in one of the boxes and an advantage of the scheme is that only one pilot is required.

Relay unit for the B.T.H. crane conductor protection system



Steel Lined Elastic Tube

HAVING a large number of possible applications is a new tube which combines the durable, corrosion-resistant properties of plastics with the rigidity of steel. Marketed under the name of "Burcol," it comprises normal steel tubing covered with a skin of p.v.c. and is now available from GEO. BURN LTD., Smethwick, Birmingham. Large scale production is envisaged, with the anticipation that "Burcol" will be available at a price considerably below that so far possible for this type of product At present, the new tubing is being produced in four standard colours, off white, black, red and apple green, although most colours and shades will be manufactured to special requirements. Six sizes are made, from ⅜ in. to 1¼ in. o.d.

Transformers for NATO

A NEED has arisen for equipment to be available as spares for incorporation in American gear supplied to countries participating in the N.A.T.O. agreement. In view of this GRESHAM TRANSFORMERS LTD., Twickenham Rd, Hanworth, Middlesex, have extended their range of transformers being made to American Standards. Of recent years they have been making welding and low frequency transformers from 50 to 1,000 kVA but now have included the smaller sizes due to N.A.T.O. demands which require transformers to U.S. Service Specification No. MIL/T.27. Considerable research has been undertaken by the firm to incorporate materials available in Britain which meet the humidity, temperature and size conditions laid down. As a result a complete range of transformers has been produced in each of the usual types—open, enclosed, resin-moulded among others.

Industrial Vacuum Cleaner

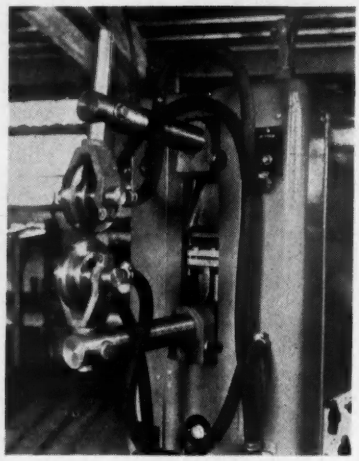
A NEW industrial type vacuum cleaner has been produced by FILTAVAC LTD., 64a Kensington Church St, W.8, specially designed for the onerous conditions of factory cleaning. Exterior tubes permit access to the tops of beams up to 25 ft high and in difficult cleaning tasks extra power may be obtained by coupling two units in series. Powered by a ½ h.p. motor the cleaner is of the robust construction necessary for industrial use.

Plessey's New Chokes

DESIGNED for the radio and electronic equipment manufacturers, the new range of chokes produced by the PLESSEY CO., LTD., Ilford, Essex, embody many modern features. The clamp, pressed out from mild-steel clenches the laminations, and terminates in feet which are drilled to provide fixing holes. The coil is wound on a rectangular former, manilla paper being used between layers, and when wound is vacuum impregnated with bitumen or wax. For a tropical finish the whole choke is dipped in bitumen varnish. The connections are brought out to a tag panel on the frame, as flying leads, or on the larger sizes, to a tag band around the coil.

Seams from a Spot Welder

WHERE seam-welding of sheet steel is to be carried out, but the amount of work does not justify the installation of seam-welding plant, advantage could well be taken of an adaptation of a spot-welding machine, carried out by MERITUS (BARNET) LTD., Wood St, Barnet, Herts. The photograph shows a "Meritus" standard air-operated spot-welding machine fitted with wheel electrodes. With the machine set in the "stitch" position the electrodes open and close at regular intervals, and at the instant of closing, the welding commences. The workpiece is fed by hand into the machine as the electrodes part, causing the wheels to rotate so as to present a fresh surface to the work at each welding operation. It is admitted that the finished work will not compare with that from a seam-welder but the firm claim that a water-tight weld is obtainable with this method.



The electrode assembly of the "Meritus" stitch welder arranged for seam work

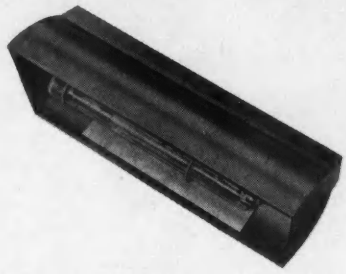
Hermetic Seal for Refrigerator

THE EDISON SWAN ELECTRIC CO., LTD., 155 Charing Cross Rd, W.C.2, have produced a 3-way plug which, although produced primarily for taking the connections through into the sealed compartment of a refrigerator, could be used for this purpose in conjunction with other hermetically sealed apparatus. It comprises three separate poles, each of which is covered by an insulating sleeve, these sleeves being set into a metal surround which is welded to the side of the refrigerator unit.

Mazda sodium cut-off Lantern

LIGHTING for class "A" roads is in the news again with the introduction by BRITISH THOMSON-HOUSTON CO., LTD., Crown Hse, Aldwych, W.C.2, of a new open sodium "cut off" lantern.

Housing either 85 or 140 W sodium vapour lamps and producing a high intensity glare-free light these lanterns can be



Brighter glarefree lighting is a feature of this new lantern

added to non-cut-off installations producing unobtrusively, an increase in road illumination over a dangerous stretch of road. Optical control is by two specially weatherproofed concave mirrored glass reflectors mounted internally on either side of the canopy. Main beam is provided at 70° with cut off between 75° and 80° from the vertical to conform with Code of Practice CP. 1004 Pt. 1, 1952.

Canopy of the lantern is made of bonderised sheet steel, zinc chromate primed and finished in aluminium paint. An aluminium casting with a 1¼ in. socket provides an anchorage for the lantern which is side entry mounted on a bracket arm and secured by two internal locking bolts. Lanterns are supplied individually packed less lamp at £8. 13s.

Fluorescent Lamp Development

THE range of "new warm white" fluorescent tubes produced by the GENERAL ELECTRIC CO., LTD., Magnet Hse, Kingsway, W.C.2, and introduced earlier this year, has been extended to include an 8 ft 125 W lamp for which an efficiency of 55 lumens/Watt is claimed. The announcement giving this news also states that the efficiencies of two tubes of the Osram Natural fluorescent tube range have been raised such that the average light values over the first 5,000 hr. have been increased from 2,720 to 3,120 lumens for 5 ft 80 W lamps and from 1,520 to 1,640 for 4 ft 40 W lamps.

Inexpensive House Lighting Plant

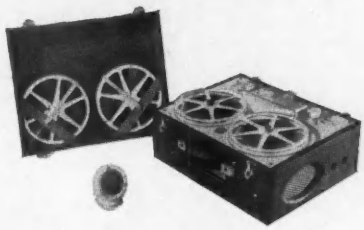
INTRODUCED at the Royal Show by A. C. MORRISON (ENGINEERS) LTD., Cliff Works, Burton on the Wolds, Loughborough, is a new inexpensive miniature lighting set which has an output of 340 W and operates for 10 to 11 hours on one gallon of fuel.

Driven by a 98 c.c. 1·2 b.h.p. J.A.P. 4-stroke petrol engine the set weighs 44 lb including 6 lb base and has an output of 340 W at 25 V a.c. It is fitted with four rubber anti-vibration mountings and switch fuse output. It is available as kick-start petrol, or petrol-start/paraffin operated, at £37 or £40 respectively or with retractable handle start if desired.

Fidelity Recording for 45 Guineas

HIGH fidelity recording and reproduction is brought within the means of all with the introduction of the new 1954 Belcanto tape recorder by BROWN AND BRETHERTON, 2 Glendower Place, S.W.7. This two-speed, 2½ and 5 per sec (or 3¾ and 7½ per sec if required), twin track model is fitted in a rexine covered cabinet, weighs only 25 lb, yet gives 3 hours speech or 1½ hours music recording and

Neat and lightweight the Belcanto gives inexpensive efficient recording



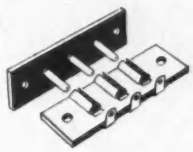
For the Electrical Trade

first quality reproduction yet complete with Lustraphone crystal microphone mains lead and plug ready for use it costs 45 guineas. Made and designed by the Willesden Tool and Frame Co., Ltd., from British made components the Belcanto has an attractively simple tape deck finished in cream plastic. Optional accessories include a conference microphone, earphones of three patterns, footswitches, extra 7 in. spools of 1,200 ft high coercivity p.v.c. tape and telephone pick ups of the limpet type. Operation is by actuating arm, selector switch, tone and volume controls whilst high fidelity radio and radiogram recording can be monitored through earphones connected to extension loudspeaker plug, an E.M.I. type "Magic Eye" giving indication of recording level.

Multiple Strip Connectors

FABRICATED from the finest grade Bakelite sheet with rolled butt pointed hollow pins for tip soldering and fully floating self aligning sockets with integral solder-tags, a new range of plug and socket connectors has been produced by A. F. BULGIN AND CO., LTD., Bye Pass Rd, Barking, Essex, for use in electronic equipment requiring multiple connections.

This three way connector comprises Models T106 and 107



With both pins and sockets electrolytically tinned for reliable soldering these connectors are available in 3, 4, 5, 6, 8, 10, and 12-way types. Insulation between adjacent poles or to fixing screws has been tested to withstand 2,000 V a.c. 50 cycles but maximum recommended working voltage pole to pole and poles to fixing screw is 500 V d.c. 350 V R.M.S. a.c. Contact resistance measured with low voltage d.c. at 5 amps is less than 0·002 ohms and the maximum continuous current rating of 5 amp (a.c. or d.c.) per pole is conservatively fixed.

TRADE PUBLICATIONS

REMOTE CONTROL.—Londex Ltd., 207 Anerley Rd, London, S.E.20, have published new lists as under: List 94/F, Lectralevel liquid level control systems; List 159, Heavy Duty Mercury switch relay contractor Type L. Q A. List No. 160, Control Units for small generating sets. A portable obstruction light which, battery operated, gives a "winking" warning light is featured in another list.

MOTORS. — Lancashire Dynamo and Crypto, Ltd, Trafford Pk, Manchester 17, have published List A.1—Stock List of Standard S.C.K. and slip-ring motors 400/440 V 3-phase 50-cycles.

TELEPHONES.—Strowger P.A.B.X. Subscriber attended private automatic branch exchanges (inc. type 4-1-1) are described in leaflet 1161 and 1262 just issued by the Automatic Telephone and Electric Co., Ltd, Strowger Works, Liverpool.

P.V.C. SLEEVING.—Samples and price lists of p.v.c. sleevings are available from Plasticable Ltd., Hawley Lane, Farnborough.

APPLIANCES.—Swan Brand electrical appliances and ground base aluminium hollow-ware are listed in new Catalogue No. 76. Bulpitt and Sons, Ltd., Swansea Works, Birmingham 1.

CONTRACTORS GEAR.—"Geopi" Portable electric traffic controls; a new acid resisting unbreakable rubber bucket and inexpensive portable canvas census huts, are featured in leaflets issued by Geo. Pike Ltd., Equipment Works, Alma St, Birmingham 6.

NEWS OF THE WEEK

H.P. Relaxation will boost Autumn Trade

'No Deposit' the Limit, but Financial Restrictions Remain

MAIN reaction of the trade to last week's announcement by the Board of Trade lifting the limitations on hire purchase arrangements seems to have been one of surprise. Trade associations, equally taken aback, expected a flood of enquiries and requests for advice, but 'phones remained strangely silent. Nevertheless, the revocation of those restrictions was welcomed and there can be little doubt that sales of domestic appliances and radio and television sets will be stimulated as the winter draws nearer. Hire-purchase trading is now a major aspect of the economy of a very large proportion of the nation's consumers, and the country has all but returned to the pre-war position when some five million agreements were signed annually. In fact much of our present-day industry is geared to meet this demand, and large-scale unemployment would certainly occur without it.

The Hire-Purchase and Credit Sale Agreements (Control) Orders were originally introduced in February 1952. Most prominent among the items affected were radio and TV sets, aerials and cathode ray tubes, drying cabinets, refrigerators, dish washers, washing machines, floor polishers, vacuum cleaners and sewing machines. They fixed initial deposits at 33⅓% and prescribed a maximum period of 18 months for repayment of the balance. The Government now considers that present conditions no longer require the control of terms of individual agreements for particular articles. The Hire Purchase Act of 1938 remains in force, safeguarding customers against "snatchbacks" of goods worth up to £100.

An immediate boom in sales is not anticipated. The announcement came in the middle of the holiday season, and buyers are unlikely to take full advantage of the relaxation until September or October. Meanwhile traders will have some opportunity of deciding on terms to offer. In this connection, meetings of the Retail Distributors Association and Hire Purchase Trade Association are taking place this week, and it is probable that both will recommend their members to seek a 10% deposit and to keep the repayment period as short as possible, probably two years. In the past week this possible recommendation appears to have been put into practice by many of those firms quick to take advantage of the revocation, although there have been a number of cases where firms have sought no deposits at all, chiefly where finance for h.p. is found within the business. Businesses offering terms through independent finance companies are most unlikely to follow that line of action. Finance houses are still restricted in the amount of capital they can take and are limited to obtaining money largely by short term borrowing and by inviting deposits.

Commenting on the new situation last week, an official of B.E.A.M.A., whilst welcoming the announcement, emphasised the fact that benefits would also extend to the export trade. Manufacturers would be able to go ahead with technical and sales plans, he said, with the greater assurance that there would be an increasing home market to reinforce their activities. A welcome increase in sales and better trading conditions was the comment of the R.D.A.'s assistant secretary. Mr H. A. Curtis, director of the R.T.R.A. said they had complained frequently about the anomalies of the Order; removal of high deposit would make it easier to obtain TV and radio sets and they looked forward to increased sales.

B.E.P.C. VENUE CHANGED

Brighton is preferred to Margate

IT WAS officially announced last weekend that Brighton will be the venue for the Electrical Power Convention of 1955. Delegates left last June's conference with the knowledge that next year's function would take place at Margate, but the Kent resort did not appeal to all and it will be good news to those who had doubts about the suitability of Margate as a conference centre, that the earlier decision has been altered. The date has also been changed, and the 1955 Convention will now take place during the week beginning 27 June.

Those who attended the annual general meeting at the close of this year's proceedings, will recall the very mixed reception which Margate received. One of that resort's attractions was the availability of 28,000 sq. ft. of exhibition space. There was plenty of doubt, however, as to the availability of sufficient hotel accommodation, and anyone finding difficulty in making arrangements was advised to contact the Convention secretary.

Scottish Stands at Overseas Fairs

INCREASING exports of Scottish goods and co-operative participation in overseas exhibitions are the main objects of a sub-committee set up last week by the Export Group of Edinburgh Chamber of Commerce and Manufacturers. It is the first time the Group has ventured into an activity of this kind, but such a step should be most useful and advantageous in publicising Scottish industry, in view of similar successful schemes operated by other organisations in respect of U.K. goods in general. Two exhibitions mentioned particularly are the New York Fancy Goods Show and Toronto Trade Fair, but there is no reason to suppose that activities will not extend further. The idea is to organise a joint stand or alternatively to encourage Scottish firms to make a combined effort to exhibit overseas.

Ministry of Materials closes after Three Years

IT WAS announced last week that the Ministry of Materials will be dissolved next month and its remaining work transferred to the Board of Trade. The Ministry has existed for three years, to the month, and its object was to deal in materials which were in short supply. Controls on those materials had, however, been revoked and free trading in copper, lead, zinc, aluminium and tungsten, to mention but a few, restored. One of the major factors involved in winding-up the Ministry is the disposal of stocks, but the majority of the supplies held should have been disposed at the end of the year. Another is the continued purchasing of some materials under long-term contracts still in existence. These purchases incidentally include the acquisition of some 100,000 tons of copper, lead and zinc. The contracts do not expire until the end of next year. These and other outstanding functions will all be transferred to the Board of Trade, and there is no suggestion that the Ministry of Supply will be involved.

It was also announced last week that the London Metal Exchange copper contract is to be altered from an ex-ship or ex-refiners' works basis to an in-warehouse warrant basis. Date of the change has not yet been fixed.

MACHINE TOOL SHOWROOM OPENED AT WEMBLEY

IN 1937 when the firm of M. C. Layton Ltd. was founded their idea was to offer production engineers a range of machine tools, all these being available for inspection under one roof. Last week, Mr M. C. Layton inaugurating the company's new showrooms in Abbey Wharf, Wembley, stated that the demand for the kind of service originally envisaged has been proved, and the present display was the culmination of their efforts. In the modern 9,000 sq ft showroom a wide variety of machine-tools including capstan lathes, shapers, grinders, milling machines, presses and drilling machines were available for inspection. One week in each month is to be given to demonstration of special equipment by an expert who will answer any questions.

Top: General view of the extended Tonbridge showroom; and, above, Mr N. Boydell presenting Clr. Dawes with an electric clock. At the foot of the page is a view of the Wickham showroom

Seeboard opens Two New Showrooms in Kent

FRIDAY, 9 July, saw the opening of two new showrooms by the S.E. Electricity Board. One was at Tonbridge in the E. Sussex and S.W. Kent sub-area, and the other at West Wickham in the Croydon and W. Kent sub-area. Mr W. R. T. Skinner, deputy chairman of the Board, was at the official opening of the latter. He recalled that the total number of consumers at vesting-day, about 859,000, had increased by nearly 200,000 and coincidently the need for more showrooms had also increased. The Board was restricted however in the amount of work it could do and had to proceed slowly. Mr Skinner said that the new showroom at West Wickham would bring the total number of centres in the Area up to 92, and was the tenth to be provided since nationalisation.

Although this new service centre has only a small frontage, the interior is spacious and should prove adequate for the neighbourhood's 8,000 consumers. It has a striking colour scheme with red and yellow predominating and full use has been made of light and dark effects to emphasise particular aspects of the premises. There is also a demonstration theatre and invitations will be extended to attend demonstrations of electrical apparatus. The first purchaser was presented with an automatic toaster to mark the occasion. In charge at the new premises is Mr G. E. Thomas.

At Tonbridge the Board's offices at 111 High St has been extended by the acquisition of adjoining property which has now been converted into a combined demonstration theatre and showroom. The expansion has also meant a doubling of the window display area. Official opening ceremony was performed by Councillor F. W. E. Dawes, chairman of the U.D.C., who was presented with an engraved electric clock as a memento of the occasion, by sub-area manager Mr N. Boydell. The new premises got off to a good start with three cookery demonstrations on the first day, and a further series will be held throughout this week in the new attractive demonstration theatre.

OFFICIAL PUBLICATIONS

BRITISH STANDARDS

B.S. 764; 1954: Automatic changeover contactors for emergency lighting systems; B.S.771: 1954: Synthetic Resin (thenolic) moulding materials.

STATEMENT OF GUARANTEE. Issued by Treasury in respect of B.E.A. Loans. H.M.S.O. 2d. (See this page.)

HIRE PURCHASE AND CREDIT SALE. Agreements (Control) (Revocation) Order. S.I. No. 935. H.M.S.O. 2d. (See page 132).

TRAINING OF SUPERVISORS. Report of Committee of Inquiry. H.M.S.O., 2s.

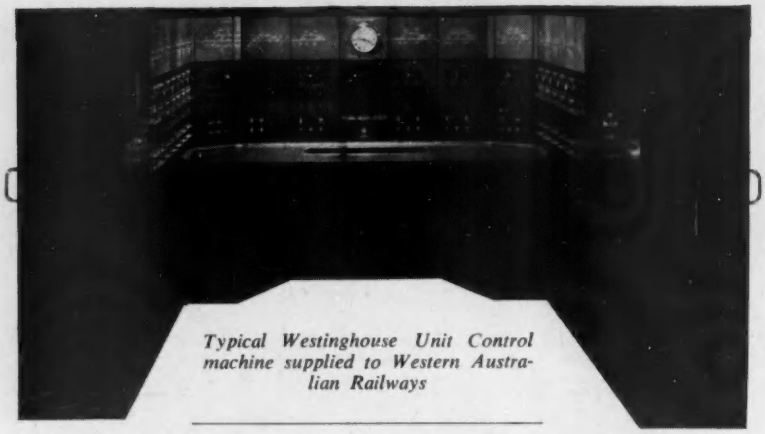
MECHANICAL ENGINEERING RESEARCH. Report of D.S.I.R. for 1953. H.M.S.O. 2s. 6d. (See page 116).

INDUSTRIAL AND DOMESTIC COAL CONSUMERS' COUNCILS. Annual Reports for 1953-54. (See page 135.)

CENSUS OF DISTRIBUTION 1950. Vol. II—Retail and Service Trades. General Tables. H.M.S.O. 22s. 6d. (See page 115).

B.E.A. Borrowing Up

A FURTHER statement of guarantee has been issued by the Treasury in respect of loans proposed to be raised by the B.E.A. The guarantee concerns temporary borrowings from Clearing Banks, Scottish Banks and other persons, which must not exceed £130 millions, and is in respect of the quarter ending 30 Sept. Previous sum guaranteed was £110m.



Typical Westinghouse Unit Control machine supplied to Western Australian Railways

Set-back for Productivity Campaign in Newcastle

PLANS by the Tyneside Productivity Committee for arranging inter-works visits in the area in an effort to increase production, are being impeded by the refusal of the Tyne Committee of the Amalgamated Engineering Union to take part in the scheme. Under the plan, in which a number of electrical firms are taking part, teams from various factories, representing management, technicians and workers, visit other factories in the area, and offer suggestions on raising output. Mr L. E. Edmondson, district secretary of the A.E.U., stated that productivity had increased by 50 per cent since 1946, but during the recent negotiations with the employers for a wage increase, it had been stated that the employees had nothing to do with this increase. The Union believed therefore that it should have nothing more to do with schemes for increasing output.

Mr R. W. Mann, chairman of the Productivity Committee, commenting on the Union's statements, said that co-operation was essential if conditions were to be improved. He said that it was not true that productivity had increased by 50 per cent. Output had gone up by this amount, but this had been chiefly due to the increased number of people at work. In some cases where firms had increased output by 100 per cent, consumers, shareholders and employees had all benefited.

The Productivity Committee is operating a 36-team circuit scheme which has been working well until the present dispute started. The A.E.U. have not objected to any of the other activities of the Committee.

Buy-American Act is Biggest Problem

THE "Buy American" Act was cited as Britain's major obstacle in her trading efforts in the U.S. last week. Speaking to the United States section of Manchester Chamber of Commerce, Mr W. J. Scott Liang, deputy consul-general commercial in New York said that experience so far showed that British firms could submit favourable quotations and often better quotations than American firms for heavy electrical plant. At the same time, our machinery was of as high a quality and probably better. The difficulty was the special considerations under the Buy American Act and not our prices, but there was hope that the position might improve in the future.

COURSES IN LONDON NEXT AUTUMN

ONCE again we are in receipt of the Bulletin of special courses in higher technology issued in respect of the forthcoming autumn term by the London and Home Counties Regional Advisory Council for Higher Technological Education. As usual there is a very generous proportion of courses on electrical and allied subjects included, and it is unfortunate that space does not allow us to enumerate them. Details of the courses are given under the appropriate college or institution where they will be held, and all are indexed under subject headings later in the booklet.

£2m. Contract for Iron and Steel Works

A VALUABLE contract worth over £2 m has been received by the General Electric Co. The company announced last week that they have undertaken as a comprehensive contract the complete power station for Colvilles iron and steel project at Motherwell. It includes civil work; four Babcock and Wilcox gas and oil-fired boilers of 125,000 lb per hour each; three 10 MW turbo-alternators with Mirrlees Watson condensing and feed heating plant, feed pumps and auxiliaries; and two steam turbo-driven centrifugal blowers of 11,000 h.p. each, for supplying air to the new furnaces.

In addition work will include two ferro-concrete natural draught towers, each for cooling 1·2m gallons of water per hour; and two pumps driven by turbines arranged to exhaust steam to process plant. There will also be the 11 kV switchgear for control of the alternators and feeders, l.t. switchgear and motors for auxiliaries, and lighting.

Control Equipment for N.Z. and Rhodesian Railways

CENTRALISED traffic control apparatus is being supplied to Rhodesian and New Zealand railways by the Westinghouse Brake and Signal Co. In Rhodesia the installation covers some 85 miles of single track, having 15 fully signalled crossing stations and these will be controlled by a 2-wire time-coded control from a station at Sawmills, about 60 miles from Bulawayo. The machine will be of the Unit Constructer type, each complete with its own storage relays, thus permitting the addition of other units if required in geographical order. Wayside relays controlling the local signalling circuits will be of the standard plug-in type, complete with pre-wired racks. At each station there are home and outer-home 3-aspect signals, and 2-aspect starting signals. Mounted below the starters are shunting signals of the Westlyte type.

Similar equipment is also being supplied to New Zealand for the Upper Hutt-Featherstown section of line. There, however, the line is only some 10 miles long and has three crossing stations. No carrier control will be needed as in Rhodesia, and control will be of the direct 2-wire coded type.

Smokeless Zone in Greater London

REDEVELOPMENT of a war-damaged area in Tottenham has provided the borough with the opportunity of establishing a smokeless zone, believed to be the first in Greater London. The zone will be in the Markfield area, which at present consists mainly of unoccupied sites. Tottenham has long been a strong advocate of the enforcement of smoke prevention measures, and received powers under the Tottenham Corporation Act, 1952 to enable them to make Orders. Occupiers of premises to be erected in the district will be liable to monetary penalties where smoke is emitted. Grates in new houses to be built on the sites will be of a type suitable for burning smokeless fuel. It will be a defence in any legal proceedings arising that the smoke results solely from an appliance suitable for burning the fuel authorised.

The Markfield Area is about 4½ acres in size, and was blitzed badly during the war. The few houses which remained are due for demolition. There are no industrial premises.

The First Half-Century

A correspondent points out that churches are not such bad customers to the electric lighting works as is generally supposed. Their load factor is, of course, very bad, but it so happens that the load comes on the night of lightest load. Consequently they improve the load-factor for the week—at any rate, in small country towns.—*From our issue of* 21 *July*, 1904.

COAL COMPLAINTS

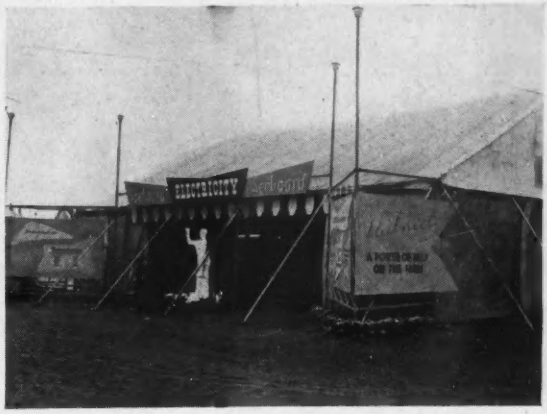
DEEP concern is expressed by the Industrial Coal Consumers Council in their Annual Report, at the quantities of coal available, and at the selling prices. It is not understood why with increasing mechanism there is no margin of production to meet demands, and the wide disparity between highest and lowest weekly output suggests that the extra coal needed is attainable. It is denied in the Report that industry is being favoured at the expense of the domestic consumer.

The Domestic Coal Consumers' Council also expresses disappointment at the continued scarcity of house coal, and of low temperature cokes since they were decontrolled. Complaint was also made that none of the smokeless fuels purports to be moisture free. At coke works, the price per ton takes into consideration the moisture in coke due to application of cooling water, but it was felt that in a small number of cases, coke was delivered with added moisture due to rain, and it was suggested that in these cases, complaint should be made to the supplier and a rebate obtained.

Exhibition on Power Factor in Sheffield

RESPONSE to the Yorkshire Electricity Board's invitation to send representatives to their special exhibition on power factor correction was extremely good. About 420 attended from some 200 local firms and were able to discuss their difficulties with both the Board's officials and with ten manufacturers who participated.

The event had particular significance in view of the introduction next October of the Board's new standard industrial tariff. If firms are to avoid having to pay more for their electricity than they need, they will have to improve their power factor. This is of even greater importance to Sheffield industrialists as the majority are on block or sliding scale tariffs which do not include penalties for power factor.



S.E. Electricity Board's stand at the 55th Sussex Agricultural Show held at Eastbourne last week. Deserted exterior was caused by one of the biggest hazards of such events—rain. Nevertheless a good crowd saw the exhibits inside centred round the theme, Electricity in the Barn, introduced by the conspicuous motif in the entrance.

Claim for £38,375 fails but B.E.A. gains £12,781

JUDGMENT was given just after we went to press last week, in the action brought by the B.E.A. to recover £38,375 which they maintained were assets of Morecambe and Heysham's electricity undertaking unlawfully applied to aid the local rates. As reported last week, those assets were said to have accrued during the two years prior to nationalisation and should have been passed on to the B.E.A. Giving a reserved judgment, Mr Justice Harman criticised the length of time taken to produce the statement of claim (4 years). He said the question was whether two sections of the Morecambe Corporation Act 1924 repealed earlier statutory instruments. Those earlier instruments did not apply, he said, so the attack on the transfers failed. Of an alternative claim, the Judge said the Authority claimed that the appropriation of two sums amounting to £12,781 from a reserve fund to the revenue appropriation account was not justified. He thought that in this case the Corporation had acted wrongly. Both parties were ordered to pay their own costs.

E.I.B.A. Branch Ball

FIFTH annual Ball of the Hants and Dorset branch of E.I.B.A. will take place at the South Parade Pier Pavilion, Southsea, on 25 November next. Further details may be had from the social subcommittee's chairman, Mr E. R. Cooper, at 111 High St, Portsmouth.

Live Line Testing

THE live line testing equipment illustrated on page 11 of the July issue of Industrial Maintenance in the article by Mr H. W. Swann is made by Everett Edgcumbe and Co., Ltd., Colindale Works, N.W.9.

NEWS IN BRIEF

Public enquiry to consider whether imported wire goods used for domestic and catering purposes should bear an indication of origin is to be opened at the Board of Trade's London offices on 19 August.

Heavy rain badly affected the Midlands Radio Industry Golfing Society's meeting last week. Eventual winner was the society's vice-captain Mr B. J. Taylor, with 81 net.

Amendment sheets have been issued by the Association of Short-Circuit Testing Authorities (Inc) to their publications Nos. 5 and 6. Their purpose is to provide for testing of circuit-breakers in their housings and for the testing of fuses.

The Minister of Works addressed the Apprenticeship and Training Council for the Electrical Contracting Industry on Monday, and presented awards of University scholarships to two apprentices.

Sixth International Mechanical Engineering Congress will not be held until 1955, but a Colloquium at Stresa is being planned to coincide with the fourth European Machine Tool Exhibition. Dr Leinweber will speak on Automation of Measuring.

Sales of electric motors used on British farms increased by 27,120 (5%) in the past two years, and sales of petrol and oil engines decreased by 22,600 (10%) in the same period, according to the Ministry of Agriculture.

Some of the stands at Y.E.B.'s Power Factor Correction Equipment Exhibition, held in the City Hall, Sheffield.

QUESTIONS IN PARLIAMENT

Trade with Soviet Bloc

ALTHOUGH the reorganisation of controls on exports to Russia is by no means complete, Mr P. Thorneycroft last week reported on the results of his discussions with his opposite number in the U.S. Object of present talks is to obtain a shorter list of controlled goods with a tighter enforcement of the embargo. He and Mr H. Stassen had reached a large measure of agreement and had agreed on lists which were acceptable to both the U.S. and Britain, and which would receive their support in discussions with the 14 other countries involved. Agreement had also been reached on certain additional methods of enforcing the ban, but a decision on timing had been deferred although our own view was that the quicker the changes were implemented the better. Further talks with the U.S. on timing would take place during the next 10 days.

Industrial Research

CONCERN lest the results of British research might be utilised by our foreign competitors was expressed by Mr Ellis Smith. He asked what steps were being taken to guard against this eventuality, and also how many applications had been received by D.S.I.R. for assistance from firms co-operating with British, German and Japanese firms. Mr R. A. Butler replied, and said that in addition to published information the Department helped British industry by making available its unpublished scientific and technical information and experience. That assistance was not available to foreign concerns. Research Associations strictly controlled foreign membership, he added. Mr Smith said that in a number of cases manufacturing rights had been granted to foreign undertakings, and the Chancellor agreed to examine the position.

Technological Education

THE Chancellor of the Exchequer last week made a statement on the development of higher technological education outside London. He said universities and colleges had responded willingly to the invitation to submit proposals, and the eventual result was that he had approved plans for development in which the main centres would be Glasgow, Manchester, Leeds and Birmingham. Provision had also been made for development elsewhere. They would take place at institutions already receiving recurrent grants. To increase the number of university institutions concerned would involve a dispersal of effort which was not advised, and consequently there was to be no change in the status of Bradford Technical College.

Implementation of these plans, and those for the Imperial College of Science and Technology, would need increases in resources available to the University Grants Committee. The timing of developments was being considered, and it was hoped to start on them in the next academic year. Mr Butler said he would make a further statement in due course.

Natural Gas

ASKED by Mr. Geoffrey de Freitas about licences issued for drilling in search of natural gas in Lincolnshire, the Minister of Fuel and Power said five prospecting licences had been granted to the D'Arcy Exploration Co. They covered an area of 942 sq. miles in the north-east of the county. Applications for six more licences were being considered.

Flashing Beacons

AN emphatic reply to the critics of flashing beacons was given by Mr H. Molson in a written answer. He said they were satisfied that no better alternative to flashing beacons had been devised as a means of warning motorists of the presence of pedestrian crossings. Mr Shepherd had asked whether a more useful and practical alternative would be announced.

D.S.I.R. Building

TOTAL provision made in the current year's estimates for the building programme of D.S.I.R. was £916,060, Mr Bevins informed Mr Willey last week. That sum excluded maintenance. It was calculated that constructional work of that value would be executed.

Borrowing Powers

AN extended debate on the Gas and Electricity (Borrowing Powers) Bill took place in the Commons last Friday when the Bill was read a third time and passed. In his reply to the debate, Mr L. W. Joynson-Hicks explained the Minister's earlier reference to coal and oil-burning stations. He said arrangements would be made to enable dual-firing to take place, whichever was more economic or expedient at the particular time, and not to switch power stations over to oil-burning. On the subject of rural electrification, he explained that the Bill did not cover such projects and was only connected with those developments inasmuch as an extension of electric lines would require an increased supply of power. Mr G. Lloyd finally promised to bear in mind two questions raised concerning the expansion of agriculture and of industrial refrigeration for food in connection with civil defence.

V.H.F. Broadcasting

A MATTER which has not appeared at Question Time for a little while is the subject of very high frequency broadcasting. Sir H. Roper asked recently, however, for a statement about the B.B.C.'s proposals in this connection, and was told by Mr D. Gammans that one could be expected very shortly. Replying to further questions Mr Gammans said he did not agree with the view that V.H.F. broadcasting was a long-term proposition. He declined to make more detailed comments on possibilities for particular localities in the U.K. Cornwall, Wales and Scotland were mentioned.

Pollution of Atmosphere

WHEN would the results of the Medical Research Council's report on the extent to which fumes and smoke from fuel oils contributed to causes of cancer, be ready, enquired Mr S. S. Awbery last week. He was reminded that the Council was studying various aspects of atmospheric pollution. Results would be published in the scientific Press as they became available, but investigations were of a long term nature and no estimate of the date of their conclusion could be given.

Gas Turbine Locos

WHAT information had been gained from the experimental gas turbine locomotives operated by British Railways on behalf of the Minister of Fuel and Power, asked Mr G. Darling last week. He was told that the only one being developed for that purpose was still under construction and not yet ready for trials. Mr L. W. Joynson-Hicks assured Mr P. Noel-Baker that experiments proceeding at the Fuel Research Station had given satisfactory results.

BEA's Gas Turbines

PERFOMANCE, types of fuel used, operating costs, thermal efficiency and other relevant facts concerning the use of gas turbines in power stations, were sought by Mr G. Darling. The Parliamentary Secretary to the Minister of Fuel said regular progress reports on the development of the oil-fired gas turbine were available. The machine was not yet in operational use and he advised contacting the B.E.A. for the detailed information required.

Sayings OF THE WEEK

"A refrigerator, properly used, is of far more value to a family's health than a television set." . . . DR FRANK COCKCROFT, medical officer of health for Littlehampton.

"It would appear that the only way to deal with this unfavourable form of economy (subsidised foreign competition) is by negotiation and, if that fails, by open forceful and overwhelming retaliation." . . . MR SAMPSON GOLDSTONE, chairman of Ward and Goldstone Ltd.

"The evidence points to electricity shaking itself from a partly self-induced stupor and preparing to do serious battle." . . . *The Gas Journal* commenting on the article "Are we Shy about Electricity?" published in the 17 June issue of the ELECTRICAL TIMES.

COMPANY ACTIVITIES

IT is difficult not to believe that manufacturers of domestic electrical apparatus of all kinds are going to have a very good time indeed for some time to come. Last year output of vacuum cleaners rose by 26%, television sets by 41% and electrical equipment by 45%. Now we have the relaxation of restrictions on hire-purchase which has already created fresh demand in the shops. Then in the autumn will come the new multi-viewing television sets which are bound to attract many new viewers.

Already companies are doing extremely well. On last year's improvement in output, Electrical Components Ltd. for instance which are wholesale distributors and agents, increased their profits by £29,000 to £139,000 before tax. The Ordinary dividend remains at 20% which has never been less than twice covered since it was first paid in 1946—47.

The full report of Engineering and Lighting Equipment Co. gives further particulars of a remarkable recovery during the last six years. I recently explained that following the cancellation of Admiralty contracts in 1947 the board decided to diversify its scope of production. There has also been a tremendous improvement in productivity. Since 1948 the numbers of staff have risen by 22%. Against that, annual sales turnover has gone up by 378%. The 30% distribution which includes a 10% bonus is covered by earnings of 150% despite an E.P.L. payment of about 45%.

It looks as though there is to be another share bonus for shareholders of Reliance-Clifton Cable and Industrial Products. At the annual meeting, Sir Robert Renwick said that since 1951 a holder of £4 of Ordinary stock had received in scrip a total of £3 of Ordinary stock and £3 of Preference Stock. "I hope," he said, "that it may be possible to round off this operation in the not too distant future." He also said that reserves are adequate to deal with proposed capital expenditure over the next few years. "And the board will have this in mind in considering future dividend recommendations." Sir Robert said that the company has been standing up well to very difficult trading conditions in the first six months of the present year. It was also his opinion that there is no question but that the demand for electric cables for all purposes will continue to increase. Be that as it may, Scottish Cables has decided to enlarge its activities. Although the difficult period in the cable industry is now over, according to chairman Mr William Fraser, and the current year has started off well, some of the schemes Mr Fraser had in mind are now to be proceeded with. In particular he is undertaking the manufacture of rubber insulated and plastic insulated cable sections, while arrangements are in hand to start the manufacture of telephone cables through a recently acquired subsidiary, Scottish Telephone Cables and Equipment Ltd.—*From our City Correspondent.*

Ada (Halifax) Ltd.

Production capacity is being increased during the current year by the erection of an extension to one of the factories and the modernisation of certain plant and machinery, Lt.-Col. W. D. Gibbs, the chairman, stated at the meeting last week. Output of washing machines will thus be increased. The additional space will also enable the company to launch later this year a popular-priced dish-washing machine upon which development work is in an advanced stage.

Aron Electricity Meter Ltd.

Mr E. D. A. Herbert, the chairman, is agreeably surprised at the figures for the past year—total turnover was higher than had been expected—but he doubts if the figures for the current year will be so satisfactory. Recent months have brought a reduction in the normal demand for the standard types of meters, although there has been some compensating increase in sales of certain special types. There are now indications of a falling off in business of other specialised engineering apparatus and instruments. Meantime every effort is being made to push on with the design and development of new forms of apparatus and equipment, but some considerable time must elapse before any benefit can be obtained from these developments, he warns. There has been a very encouraging improvement in the export market since the beginning of this year. It is hoped this will continue for some time to come.

Year to Mar. 31	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1950	88,470	20,519	25	15	42/6	29/-
1951	119,200	35,070	44	15	43/9	38/3
1952	134,807	34,283	43	15	37/6	31/6
1953	214,905	41,801	50	20	47/6	36/3
1954	202,283	52,765	63	15	50/-	43/-

Belliss and Morcom Ltd.

With a full order book, and in spite of keen competition, it is likely that the dividend is capable of being maintained in the year to 31 Mar. next, Mr R. K. Morcom, the chairman, states. Turnover continues to expand and the directors are concentrating on a further expansion of output, more economical production and new designs of products.

Britannia Electric Lamp Works Ltd.

The dividend for the year to 31 Mar. last is again 12½%, but the net profit amounts to £59,513 compared with £24,374 for the previous year, after charging increased taxation.

E. K. Cole Ltd.

A new high record turnover was achieved during the year ended 31 Mar. last. This is reflected in the figures shown in our accompanying table. Stock and work in progress at the end of the year was valued at £2,441,841 compared with £1,782,929 a year earlier. Mr E. K. Cole states that that increase results mainly from the necessity of expanding sale-or-return despatches during Jan., Feb., and Mar. A large percentage of the finished stock figures for the home market is represented by goods delivered to dealers on that basis and invoiced after 31 Mar. The company's Radio Division experienced good trading conditions during the year and maintained its normal share of the market, he states. The Heating Division increased its turnover, and it is hoped that further expansion will take place this year, with better trading results. Work has been done for special types of heaters for aircraft. Although the company's exports reached a substantial figure, including a quantity of television sets to Italy, the previous year's record total was not reached. At last Thursday's meeting, approval was given to an increase in the authorised capital by the creation of a further 2,200,000 Ordinary 5/- shares.

Year to Mar. 31	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1950	304,042	103,450	77	20	18/6	14/9
1951	514,740	169,050	142	25	21/3	13/10
1952	568,525	163,715	111	25*	17/7	13/6
1953	652,781	134,202	73	25†	23/10	14/2
1954	719,010	181,332	101	27½	31/3	22/6

*Plus 25% capital bonus. †Plus 16⅔% capital bonus

Electrical Components Ltd.

With a final dividend of 12½% there is again a total distribution of 20% for the year ended 31 Mar. last. The group trading profit for the period, before taxation, is £138,943 compared with £110,008 for the previous year.

George Kent Ltd.

For this instrument concern, the final dividend is 9½%, again making 12½% for the year ended 27 March last on the increased capital. The parent company's net profit is £149,414 compared with £214,017 a year ago.

Electrical Switchgear and Associated Manufacturers Ltd.

The volume of turnover of Brookhirst Switchgear Ltd., the wholly-owned subsidiary, was maintained at a satisfactory level, the directors report. The full accounts show that the amount on loan from Metal Industries Ltd. to Brookhirst was again increased during the year and at 31 Mar. last amounted to £530,000. In addition the subsidiary had a loan of £136,000 from E.S.A.M. Ltd.

Larmuth and Bulmer Ltd.

The net profit for the twelve months ended 31 Mar. last is £21,102, compared with £20,552 a year ago. A final dividend of 10% again makes the total for the year 17½%.

Reliance-Clifton Cables and Industrial Products Ltd.

The factory is still well occupied, although the order book does not justify the extent of overtime working which was necessary at the corresponding period last year, Sir Robert Renwick, the chairman, reports. Short term orders and a decrease in profit margins reflect the change in conditions, but he states that trading results for 1954 should not be unsatisfactory.

Revo Electric Co. Ltd.

The severe reduction in trading profit for the past year, shown in our table, was due to such adverse factors as the extra costs from reorganisation of the works, trade recession in the first part of the year and increased costs in all directions throughout the year without corresponding adjustments in selling prices, according to Mr W. L. Barrows, the chairman. The company's new cooker is meeting with a most encouraging reception, he states. Works reorganisation is progressing, and the order book gives grounds for optimism. But the company is facing severe competition, he warns, and while the directors anticipate an improvement in the profit for the current year they do not expect it to be substantial.

Year to	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1950	289,246	112,306	56	27½	45/6	37/3
1951	348,043	121,763	63	27½	48/9	38/11
1952	478,964	170,542	88	27½	43/–	30/–
1953	463,682	171,590	85	27½*	17/4	13/11
1954	213,638	48,904	8	9	19/6	16/7

*Plus 200% capital bonus.

Simon-Carves Ltd.

For the year ended 31 Dec. last, the trading profit, after adjustments of special provision for retention balances on completed contracts, amounts to £616,112, against £760,695 for the previous twelve months. A final dividend of 7½% again makes 20% for the year, but on the larger capital. The net profit amounts to £163,784 (*£279,206*).

Ward and Goldstone Ltd.

The record production and sales achieved in the past year are reflected in the profit figures shown in our accompanying table, but Mr. Sampson Goldstone, chairman, warns that profit margins have fallen and are still falling. Conditions in the home trade improved last year, but the export problem is serious and urgent. While the company succeeded in increasing the volume of export sales over the previous year, many of the larger transactions were executed virtually without profit.

Year to Mar. 31	£ Trading Profit	£ Net Profit	% on Ord. Earnec	% on Ord. Paid	Ord. Price High	Ord. Price Low
1950	363,581	141,607	214	44*	49/–	34/6
1951	477,643	188,547	298	45†	46/9	34/4
1952	513,580	185,071	267	45‡	32/6	27/–
1953	620,512	197,536	205	45	45/6	29/9
1954	804,328	266,616	280	50§	51/6	41/3

*Plus 25% capital bonus. ‡Plus 33⅓% capital bonus.
†Plus 10% capital bonus. §Plus 100% capital bonus.

Dividend Declared

Hoover Ltd. Interim of 10% (*same*).

Electric Supply News

Bristol

Criticisms of some of the substation sites of the South Western Electricity Board in Bristol, were made at last week's meeting of the city council. One member, Mr L. J. Poole, suggested that before the Corporation allowed the Board to purchase a further 16 sites for substations they should seek an assurance that they would be well kept. He asserted that when the substation sites had been under Corporation control they had been model sites. Now they were overgrown with weeds, were rubbish dumps and eye-sores. Alderman C. R. Gill, chairman of the Housing Committee, said the Housing Manager had written to the Board on many occasions, asking them to give some attention to the matter. It would now be followed up through the committee.

Carmarthen Bay

The official opening of the B.E.A.'s Carmarthen Bay power station by Sir Henry Self, deputy-chairman (administration) of the Authority, is to take place on 27 Aug. The station has been in operation for about a year and now has two 52·5 MW Metro-Vick turbo-alternators and five Babcock and Wilcox boilers in commission.

Gloucestershire

The objection made by the Gloucestershire branch of the Council for the Preservation of Rural England, against the B.E.A.'s proposal to erect the new main transmission line running from Hams Hall to Melksham, across the Cotswold Hills, has not been upheld by the Minister of Fuel. An inquiry took place at Cheltenham last January when an alternative route through the Severn Valley was suggested. The B.E.A. has now been given formal consent to start the work, it was stated at a meeting of the Gloucestershire branch of the C.P.R.E. last Thursday. But the branch agreed to pursue the matter further with the Ministry in an effort to delay the starting of work on the scheme.

Lake District

The Lake District Planning Board has decided to obtain the services of a consultant electrical engineer to advise it on the proposed routes for the provision of electricity to Langdale and Borrowdale valleys. The Electricity Board has intimated that it was possible that the lines would be erected in the following order: Grasmere to Elterwater, Elterwater to Chapel Stile, Chapel Stile to Langdale, and Barngates to Skelwith Fold and Elterwater. It was possible that work on erection of the Grasmere-Elterwater and Barngates-Skelwith-Elterwater lines might proceed at the same time.

Nenagh

The Eire Electricity Supply Board has given the Urban Council an estimate of £300 for removing a pylon from a field where it is proposed to build houses. After considering this, the Council passed a resolution calling on the Electricity Supply Board not to erect pylons on potential housing sites in future without having first consulted the local authority. At the Council meeting, Councillor J. Gleeson remarked, amidst laughter, that two days after a pole had been erected on his land he got notice from the Board stating it was their intention to place a pole there.

North Eastern

At the quarterly meeting at Newcastle-on-Tyne of the North-Eastern Consultative Council of the North-Eastern Electricity Board, it was reported that during March, April and May new substations had been put into operation at 276 places, the great majority for supplying electricity to villages and farms. In addition, h.v. supplies had been given to 21 industrial and commercial consumers, and during the same period 137 miles of cables and mains had been commissioned. During the quarter, 321 agricultural premises had been supplied with electricity, and agreements had been negotiated for supplying another 404 premises. Twenty-one villages, most of them in the Tyne sub-area, were brought on supply during the quarter. It was reported that the Electricity Board had approved estimates amounting to £1,095,386 covering supply projects involving 74 housing schemes and 249 rural supplies.

Spennymoor (Co. Durham)

The Urban Council has consented to the supply of electricity to the village of Byrers Green by means of overhead lines. The Council was informed by the North Eastern Electricity Board that if it insisted on underground cables, it would add to the cost of supplying energy and also cause a delay in carrying out the work.

LIGHTING SCHEMES

Coleraine. The Borough Council is to discuss the question of adopting electric street lighting. The Electricity Board for N. Ireland has said the capital cost will be between £30,000 and £35,000.

Douglas (I.O.M.) The T.C. is seeking consent to borrow £13,000 for the conversion of 77 gas street lamps to fluorescent lighting.

Scarborough. The Town Council has received loan sanction for £8,089 for installing electric street lighting in Filey Road, Harcourt Place, Falconer's Rd, Vernon Rd, Ramshill Rd, Somerset Terr, and St. Nicholas Cliff which are at present served by gas.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

23 July—Lichfield (Staffs). Lamps and fluorescent tubes to Lichfield, Sutton Coldfield and Tamworth Hospital Committee.—See 15 July issue.

23 July—Newcastle-on-Tyne. Supply of electrical cable for Tyne Improvement Commission. Secretary, J. K. McKendrick, Bewick St, Newcastle.

23 July—Sunderland T.C. Installation in Hylton Red Hse school.—See 8 July issue.

24 July—Inverness. Installation in 34 houses at Drumnadrochit.—See 15 July issue.

24 July—Peterborough T.C. Installations in 80 flats on Dogsthorpe North estate.—Advertised in 15 July issue.

24 July—Seaton Valley U.D.C. Installation in 225 houses at Seghill.—See 15 July issue.

24 July—Southport T.C. Installation in 54 houses on Radnor Drive estate.—See 15 July issue.

26 July—Leeds. Electrical services in twin operating theatre unit at County Hospital, York.—See June 17 issue.

26 July—Wrexham T.C. Electrical installation in three community centres. Borough Engineer and Surveyor, 31 Chester St. Deposit £2 2s.

27 July—Clackmannan. Columns, sodium lanterns with control gear, etc., for relighting trunk road A19.—See 8 July issue.

28 July—Ilford T.C. Plant and equipment, for Roden St sewage pumping station.—Advertised in 24 June issue.

29 July—Belfast T.C. Supply, erection, etc., at first extension of Power Station West of one 4-ton mobile crane. Tender No. N.1511. Merz and McLellan, consulting engineers, Carliol Hse, Newcastle-on-Tyne. Deposit £5. 5s.

29 July—Luton T.C. Electrical installation in William Austin school. Borough Engineer, Town Hall. Deposit £2. 2s.

29 July—Stoke-on-Trent T.C. Electric lamps included in supplies required in six months ending 31 Mar. City Surveyor, Town Hall.

30 July—Blackburn R.D.C. Pumping plant in duplicate for part 2 of Eccleshill sewerage scheme.—See 15 July issue.

30 July—Taunton T.C. Sewage and storm water pumping plant, etc.—See 10 June issue.

30 July—Wigan T.C. Wiring installation in four blocks of shops and flats at Logwood Junction. Borough Engineer, Municipal Buildings, Hewlett St. Deposit £1. 1s.

31 July—Belfast. Installation in St. Patrick's Training School.—See 1 July issue.

5 Aug.—Belfast T.C. Installation in bakery school.—See 8 July issue.

5 Aug.—Kingston-on-Hull T.C. Installation at Thanet county primary school infants' dept.—See 15 July issue.

5 Aug.—Southampton T.C. Installation in Harefield junior and infants' school.—Advertised in 15 July issue.

6 Aug.—Heckmondwike U.D.C. Installation in old people's dwellings in Strawberry Sq.—See 15 July issue.

6 Aug.—Swansea T.C. Electrical installation at Fforest Hall primary school. Applications by above date to Borough Architect, The Guildhall. Deposit £2.—Advertised in this issue.

7 Aug.—Pwllheli T.C. Installation for auditorium of Town Hall.—Advertised in 8 July issue.

9 Aug.—Kidderminster T.C. Lighting and power installations, in the Retail Market, High St.—Advertised in 8 July issue.

10 Aug.—Blackpool T.C. Supply of steel poles, double arm brackets, bases and cast finials. Illumination and Public Lighting Officer, Rigby Rd East.—Advertised in this issue.

13 Aug.—Co. Tyrone. Installation at Dungannon secondary intermediate schools.—See 8 July issue.

13 Aug.—Belfast T.C. Tenders W.43 invited for replating cells of storage battery at East Bridge St station. Electricity Dept., E. Bridge St. Deposit £1. 1s.—Advertised in this issue.

14 Aug.—Dagenham T.C. Supply, erection of 317 group B street lighting units and conversion of another 10 units, in 10 roads. Borough Engineer and Surveyor, Civic Centre.

16 Aug.—Bradford T.C. Supply and erection of electrically driven vertical spindle centrifugal pumps and complete installations for two pumping stations at Tong. City Engineer and Surveyor, Town Hall. Deposit £2. 2s.

16 Aug.—Denton U.D.C. Street lighting conversion units for attachment to existing gas columns.—See 15 July issue.

16 Aug.—Manchester T.C. Installation at Poundswick grammar school.—Advertised in 15 July issue.

19 Aug.—Belfast T.C. Boiler feed pumps for first extension of Power Station West.—Advertised in 1 July issue.

21 Aug.—Castlebar (Eire).—Supply of numerous items of machinery, including arc welding transformers, power hacksaw, drill, lathe, hammer, etc., for Machinery Yard. J. O'Donnell, Courthouse, Castlebar.

23 Aug.—Spilsby (Lincs.) R.D.C.—Manufacture, supply, erection of centrifugal pumps and ejectors for crude sewage, with electric motors, switchgear, etc., at eight pumping stations. Engineers are Binnie, Deacon and Gourley, Artillery Hse, Artillery Row, Westminster. Deposit £5.

25 Aug.—New Mills (Lancs.) U.D.C. Conversion of 110 gas street lamps to electricity and erection of 3 new electric street lamps. Clerk of Council, Town Hall, New Mills, Stockport.

25 Aug.—Wandsworth B.C. Repair of about 700 time switches. Advertised in 15 July issue.

27 Aug.—Leeds T.C. Electrically-driven multi-stage centrifugal pumps with electric motor and switchgear.—See 8 July issue.

27 Aug.—Leeds. Installation of underground cables and lighting at Castle Hospital, Cottingham, for Regional Hospital Board. Apply by 28 July to Architect to Board, Park Parade, Harrogate. Deposit £2. 2s.

30 Aug.—Leeds.—Electrical installations in buildings at Scalebor Pk Hospital, Burley-in-Wharfedale. Applications to Architect to Hospital Board at Pk Parade, Harrogate, by 28 July. Deposit £2. 2s.

30 Aug.—Ramsbottom U.D.C.—Supply, erection, etc., of 15 concrete columns, and other equipment for 140 W sodium lighting in Bridge St. Engineer and Surveyor, Council Offices.

No date stated—Aberdeenshire. Installation of electricity at five schools.—See 15 July issue.

No date stated — Malden and Coombe (Sur.) T.C. Street lamps for group B lighting in Beverley Way, Beverley Lane and Coombe Hill Rd.—See 15 July issue.

No date stated—Preston T.C. Installation in Gammull Lane hostel, Ribbleton.—See 15 July issue.

No date stated—Stone U.D.C. Electrical installation at "The Radfords," Longton Rd. Engineer and Surveyor, Town Hall.

No date stated—N. of Scotland H. E. Board. Lighting, heating and other subsidiary services at Quoich power station. Kennedy and Donkin, 12 Caxton St, London, S.W.1. Deposit £2. 2s.—Advertised in this issue.

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 119 queries answered this week

"Brownson" dinner wagon, makers of? T.B.C.—A Browne and Son (Sheet Metal Workers) Ltd., 123a Broadley St, N.W.6.

"Castra" washing machines, makers of? Y.E.B. — Easiclene Porcelain - Enamel (1938) Ltd., Kent Hse, Market Place, W.1.

"Safeguard" washing machines, makers of? C.W.G. — Safeguard Electrical Appliances (Dewsbury) Ltd., Old Anchor Works, Dewsbury.

Key switches with "Yale" type keys as noted by "Megohm" in 24 Mar., 1954, issue, makers of? G.K.J.—Wandsworth Electrical Mfg. Co., Ltd., 136 Cromwell Rd, S.W.7; Britmac Electrical Co., Ltd., 121 Victoria St, S.W.1.

"Tania" floor polisher, makers of? D.H.T.—Columbus-Dixon Ltd., Capitol Works, Empire Way, Wembley, Middx.

"Vidaflex" glass sleeving, makers of? A.W.—Jones Stroud and Co., Ltd., Vida Mills, New St, Long Eaton, Derbyshire.

ANSWER WANTED

Resistance with a value of 8,000 ohms to dissipate 8 W, to be of the film type, i.e. a metal or carbon deposited on an insulating material by a vacuum process, makers of? S.E.L.

No date stated—West Lothian. Electrical installation in proposed new junior secondary R.C. school at Bo'ness. Apply to Surveyor, J. P. Storrier, 38 York Pl, Edinburgh.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.*

4 Aug.—South Africa. Supply of 25-line Private Automatic Exchange and iron clad telephones for Stores Dept., S. African Railways, P.O. Box 8617, Johannesburg Tender No. C.7986. B.o.T. (Ref.: ESB 16379/54)*

5 Aug.—Pakistan. Supply of lighting fittings including 284 special type pendant fittings, 61 half-circle ceiling fittings, 18 full circle ceiling fittings, and 3 decoration lanterns. Tenders No. DS/E/2553/P.1. Min. of Education and Industries, Sadarghat, Chittagong. B.o.T. (Ref.: ESB 16931/54).*

9 Aug.—Formosa. Supply of amplifier and speaker sets, telephone equipment, electric arc welding machines, welding transformers. Invitation No. 299A. Central Trust of China, U.S. Aid Div., 96 Po Ai Rd, Taipei, Taiwan. B.o.T. (Ref.: ESB 16524/54)*

9 Aug.—India. Stores Purchase Committee of Govt. of Mysore require a 110 kV 50 c/s metering equipment. Documents from the Committee in Bangalore or Trade Agent for Mysore in London, at Rs.15 per set. Tender No. 12419. B.o.T. (Ref.: ESB 17455/54).*

10 Aug.—Brazil. Supply of ten diesel driven generators of 500 kW each for Comissao Estadual De Energia Electrica, Porto Alegre. B.oT. (Ref.: ESB 16800/54).*

11 Aug.—South Africa. Tenders (No. C.7959) invited for supply of 100 cable and boxes outdoor type for 0·75 sq in. single-core 6·6 kV. Stores Dept., S. African Railways. B.o.T. (Ref.: ESB 17046/54).*

16 Aug.—India. Supply of two 1,000 kVA outdoor transformers, switchgear and other accessories. Govt. of Mysore, Stores Purchase Committee, Bangalore, Tender No. 12443. B.o.T. (Ref.: ESB 17054/54).*

18 Aug.—Portugal. Supply and erection of electro-mechanical equipment for Arade hydro-electric power station. Directorate General of Hydraulic Services, Lisbon. Deposit, Esc. 90,000,000. B.o.T. (Ref.: ESB 17028/54).*

19 Aug.—New Zealand. Tenders (P. and T. 150/7136) invited for supply of 250,000 duct. ft. conduit for lead covered telephone cable. Post and Telegraph Dept., Wellington. B.o.T. (Ref.: ESB 17133/54).*

23 Aug.—Formosa. Supply of 33 kV outdoor equipment, switchboard, six power transformers, three power condensers, and co-ordinated drive system. Invitation No. 295-D. Central Trust of China, U.S. Aid Div., 96 Po Ai Rd, Taipei, Taiwan. B.o.T. (Ref.: ESB 16822/54).*

26 Aug.—Persia. Supply of sawmill and accessories, including 13 electric motors, conveying equipment, 3 diesel electric generating sets, etc. Tender No. 430-092182-4333. Procurement Office: USOM/I. Lalezar-Now Ave, Teheran. B.o.T. (Ref.: ESB 17212/54)*

26 Aug.—N. Rhodesia. Town Clerk, Kitwe, invites tenders for supply of cable, switchgear and transformers. Documents from Town Engineer, Municipal Offices, P.O. Box 70, Kitwe, or Thornton, Maggs and Keeble, consulting engineers. P.O. Box 1834, Salisbury. Deposit £1. 1s.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 20 July

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	239½	−½	252
„ (3 months)	237½	—	—
LEAD, refined pig, min. 99·97% purity (cash)	96½	−¼	94⅜
„ (3 months)	94½	+¼	92⅛
TIN, refined, min. 99·75% purity (settlement)	759	—	572
„ (3 months)	752	+3	572
ALUMINIUM, ingots 99-99·5%	156	—	150
ZINC, virgin, min. 98% purity (cash)	77½	−¼	74½
„ (3 months)	78	−¼	74⅝
RUBBER No 1, RSS, spot (per lb.)	20½d.	−1d.	19½d.
„ c.i.f. basis, ports, Sept. (per lb.)	20 1/16d.	−1/16d.	19⅝d.
ARMOURING:			
Galv. Steel Wire (0·104 in.)	52	—	50½
Mild Steel Tape (0·014 in.)	40½	—	40

26 Aug.—Uruguay. Supply of 25 tubular, steel or aluminium columns, 8 and 9 mts. high, 90 reflectors of 1,000 W and 200 W, 28 devices for street lighting, 410 lamps of 1,000, 500 and 200 W, 230 V for exterior of Electricity Board H.Q. Spec. No. 4055. Administracion General de las Usinas Electricas y los Telefonos del Estado. B.o.T. (Ref.: ESB 17113/54).*

30 Aug.—Canada. Two steam generating units for Brandon power station, designed for ultimate capacity of 120,000 kW in four 30,000 kW units, for Manitoba Hydro-Electric Board. Consulting Engineers are H. G. Acres and Co., Ltd., 2135 Culp St, Niagara Falls, Ontario. B.o.T. (Ref.: ESB 17406/54).*

30 Aug.—Formosa. Tenders (No. 358-H) invited for supply of switchboards, transformers, capacitors, cable and potheads. Central Trust of China, U.S. Aid Div., 96 Po Ai Rd, Taipei, Taiwan. B.o.T. (Ref.: ESB 17071/54).*

7 Sept.—Pakistan. Supply of 72 kW water turbine and generators, control panel and switchboard, and spare parts. Tender No. ENG.X/30802/54. Director-General of Supplies and Development, Frere Rd, Karachi. B.o.T. (Ref.: ESB 17249/54).*

8 Sept.—Iraq. Tenders (No. VIII/8) invited for supply, construction, etc., of pumping plant for electrical pumping station at Washash, including transformer, lighting, pumping units, etc. Development Board, Ministry of Development, Baghdad. B.o.T. (Ref.: ESB 17283/54).*

10 Sept.—Australia. Supply of 1,300 bracket type street lighting lanterns with 100 spare refractors, and 200 suspension lanterns with 20 spare refractors, for Brisbane City Council. Copies of specification (No. E21/54) from Chief Engineer and Manager, Dept. of Electricity, Kelvin Hse, Adelaide St, at 10s. 6d. each.

13 Sept.—Tangier. Water and Electricity Supply Board requires supply of wooden poles to carry supply lines, and eight transformers of 5,500/200/115 V. B.o.T. (Ref.: ESB 16503/54)*

15 Sept. — Australia. Supply, erection, etc., of engine driven electrical generating plant for Balonne Shire Council. Tender No. 453. Documents from Agent-General for Queensland, 409/10 Strand W.C.2, at £2 2s.

22 Sept.—Egypt. Supply and installation of 600 h.p. electrical generating set for Beni Souef station. Municipalities Administration, Ministry of Municipal and Rural Affairs. Documents at £E.3. B.o.T. (Ref. ESB 17100/54).*

27 Sept.—Tangier. Water and Electricity Supply Board requires 4,000 kg. of uncovered copper cable. B.o.T. (Ref.: ESB 17048/54).*

Contracts Placed

Ryton-on-Tyne U.D.C. Rewiring of 218 houses at Crookhill, Lyton and Crawcrook, J. L. Morley.

Newcastle-on-Tyne. Installation in additions to St Nicholas' Hospital, Gosforth, Blackburn and Starling Ltd., £28,811.

Todmorden T.C. Extension of sodium lighting on trunk rd.: supply and erection of steel columns and brackets and wiring. N. Midlands Engineering Co., Ltd., £7,896; also supply of electrical equipment, Revo Electric Co., Ltd., £3,526.

Tynemouth. Alterations to installation at Preston Hospital, Veale Nixon Ltd, £1,437.

Chester T.C. Lighting at Highfield Junior school, A. E. Cheshire, £,1,973.

Lewisham B.C. Electrical work in second stage of Ladywell Pk housing scheme, Brakefields Ltd, £1,455.

Dagenham B.C. Installations on Marks Gate estate, Woodford Electrical Co., Ltd., £1,540.

Southgate B.C. Lanterns and control gear for improved street lighting, British Thomson-Houston Co., Ltd., £908.

Lancashire. Installation at Rivington and Blackrod grammar school, Cowap and Son Ltd., £3,575.

Lambeth B.C. Erection of 325 lamp columns in street lighting conversion scheme, Harland and Wolff Ltd., £1,811. Also supply, erection etc. of 18 lifts on Loughborough estate, Express Lift Co., Ltd., £48,228.

Blackpool T.C. Supply of 1,000 concrete columns, Stanton Ironworks Ltd., £9,600; of 1,000 lanterns, General Electric Co., Ltd., £3,942; of 1,000 80 W chokes and capacitors, Stearne Electric Co., Ltd., £2,665, of 1,250 time switches, Edison Swan Electric Co., Ltd., £4,875.

Edmonton T.C. Supply of G.E.C. lanterns, and control gear. Erecon Ltd., £3,554; supply and erection of concrete columns, and installation of above, Eastern Electricity Board, £8,739.

Guildford T.C. Class A lighting along London Rd, contracts of Harland and Woolf Ltd., and B. French Ltd., extended, £5,600.

BUSINESS PROSPECTS

Home

Aberdeen. Plans approved for extension to Dyce bacon factory for R. Lawson and Sons Ltd. Cost estimated at £65,000.

Ashton-under-Lyne T.C. H. Holme and Sons Ltd. propose to add another storey to their Moss St printing works.

Banbury (Oxon). New workshops, offices, etc., planned for site in Southam Rd by Saville Tractors Ltd.

Banstead (Sur.) U.D.C. Development of Pound Rd area will comprise erection of 12 houses, 30 flats and 11 bungalows. Eight shops and 16 flats to be built in High St and Bolters Lane.

Bebington T.C. Approval in principle given for new town hall.

Bermondsey B.C. Revised plans submitted for erection of 306 dwellings and 15 shops on Tower Bridge Rd site.

Bideford (Dev.). Tenders may soon be invited for erection of 28 extra houses on Pyne's Lane estate.

Blackburn T.C. Erection of 100 houses and flats on Shadsworth site. Borough Engineer, Town Hall.

Bollington (Ches.). Thirty-eight houses to be built at Bollington Cross.

Bournemouth. Seven- or eight-storey building to be erected on site of old Hotel Metropole at Lansdowne for Levy and Franks Ltd., 3 Fitzroy Sq, London, W.1. Cost expected to be about £200,000 and work will probably start soon.

Bradford T.C. Recommended to approve £9,800 Buttershand extensions of Wibsey trolleybus route.

Brentford and Chiswick. Approval sought for final instalment of Staveley Rd secondary modern boys' school.

Brighton T.C. Erection of block of 18 flats and 6 shops in St. George's Rd. Borough Engineer and Surveyor, 26-30 King's Rd.

Bristol. Scheme approved for multi-storey car park, the top of which may be used as helicopter landing station, and shops in Fairfax St. Tenders to be invited for first stage comprising erection of 12 shops.

Camberwell B.C. Approval sought for revised scheme for erection of 279 flats on Friary estate.

TRADE NOTES

New Branch. W. Canning and Co., Ltd., have opened new branch premises at Sheffield at 1 South Parade, Shalesmoor.

New Phone No. The telephone number of Marconi House, Strand, W.C.2, registered office of the Marconi International Marine Communication Co., Ltd., is now Covent Garden 1234 instead of Temple Bar 1577 as formerly.

The telephone number of Stoke generating station has been changed to Stoke 22685.

Area Offices. Teddington Industrial Equipment Ltd. have opened a Scottish area office at 134 St Vincent St, Glasgow (Telephone, Glasgow Central 7935), where Mr R. S. Bruce is in charge. A northern district office has also been opened at 31 Quay St, Manchester.

Change of Address. Franklin and Freeman (London) Ltd. have moved their office and works to new premises at Harold Hill, Romford, Essex. Telephone, Ingrebourne 3994.

Carlisle. Sketch plans approved for proposed Harraby secondary modern school.

Cheltenham T.C. has approved sale of Lance's site to Norwich Union Insurance Societies, London, for erection of block of offices. Architects are T. P. Bennett and Son, 43 Bloomsbury Sq, W.C.1.

Clutton (Bristol) R.D.C. Erection of 50 houses at Tinsbury. Council's Architects, Morgan and Partners, 23 Gelliwastad Rd, Pontypridd.

Doncaster T.C. Wilby Carr county secondary school, to cost about £127,500, has been included in 1955-56 building programme.

Dudley T.C. O. A. Wainwright, Tixall Hse, St. James Rd, preparing bills of quantities for 170 houses on Sledmere estate.

Essex. C.C. has approved erection of 80 houses in various districts.

Glastonbury T.C. Secondary modern school to be built at Land Mead.

Haltwhistle. Smith and Walton Ltd, Hadrian Paint works, to carry out extensive modernisation at their factory. Proposed to install new power facilities, machinery, conveyors and electrical equipment, as well as erect new building.

Hampshire. Construction of Fareham secondary grammar, Lymington secondary modern, Farnborough Fox Lane junior, and Hythe junior schools. County Architect, the Castle, Winchester.

Harold Hill (Essex). Fifty-nine houses to be built on six sites on Harold Hill estate.

Harrogate. Extensions at Harlow Grange costing £25,000 planned by Yorkshire Assoc. for Care of Cripples.

Hemel Hempstead. Architect for factory proposed by D. Allan (Dallan Products) Ltd., is D. M. Evans, 7 Catherine Place, London, S.W.1.

Hendon. Extensions at Claremont secondary school and erection of Moat Mount secondary modern school estimated to cost £13,349 and £208,455 resp.

Horwich (Lancs). Research establishment being planned by J. W. Roberts Ltd., of Leeds, in Chorley New Rd.

Hull T.C. Tenders likely to be invited soon for electrical installation at Central Omnibus Garage.

Islington. It is proposed to build 32 maisonettes in 3 blocks and 40 flats in 2 blocks on Chillingworth Rd site.

Jarrow-on-Tyne. R.C. church costing about £15,000 to be built in York Ave. Architect is E. A. Gunning, 18 Eldon Sq, Newcastle.

Lewisham. County primary school proposed at Sydenham Hill. Cost estimated at £92,225.

Liverpool. Permission sought to borrow sum of £168,300 for erection of Hillfoot Hey and New Hey secondary grammar schools.

Littlehampton. R. W. Scott and Sons Ltd. plan to build factory on Lineside industrial estate.

London. New factory proposed by Whitefields Ltd., at their premises in Tummarsh Lane. Plans by F. Snow and Partners, Monro Buildings, Wellington St, W.C.2.

Newcastle-on-Tyne T.C. Yorkshire Insurance Co. to build offices in Pilgrim St to plans by P. L. Browne, Son and Harding, Pearl Bldgs, Northumberland St, Newcastle. Revised plans by M. Gatoff, 51 Grainger St, Newcastle, approved for furniture factory in City Rd, for E. Kahn and Co., Ltd.

Also, permission has been received to go ahead with four new schools. A C. of E. and an R.C. school to be built in this year's programme, and Rutherford high school for girls and Fairfield school for boys in next year's. Consultants to be appointed for electrical and other work in third phase of Rutherford College of Technology.

Nuneaton. Plans approved for factory in Avenue Rd, for Nuneaton Hosiery Co., Ltd. Also Francis and Wilebur Ltd., Hill St, Hinckley, propose to build factory in Cauldwell Rd.

Plymouth. Dent, Allcroft and Co., Ltd., to build factory at Prince Rock. Architects are A. F. French and Partners, Pearl Assurance Hse, Royal Parade.

Preston. Scheme for pathology and public health laboratory at Royal Infirmary approved in principle.

Romford T.C. It is proposed to erect 54 flats in 3-storey blocks in White Hart Lane, West Side.

Ruislip-Northwood U.D.C. Erection of 34 houses and 18 bungalows at South Ruislip. Engineer and Surveyor, Council Offices, Oaklands Gate, Northwood.

Saltash (Corn.) T.C. Scheme approved for reconstruction of blitzed Fore St shopping centre. Estimated cost, £45,000.

Somerset. Erection of Churchill and/or Williton secondary modern schools. R. O. Harris, County Architect, Park St, Taunton.

Stanley (Dur.) U.D.C. Loan sanction for £2,077 received for installation of electricity in 210 council houses at Craghead.

Twickenham T.C. Approval granted for erection of five-storey block of shops between railway station and cinema.

Overseas

Mexico. Recently formed Hersnic Machinery Co. S.A. of Progress 185—6° Piso, Mexico 18, D.F., wish to contact U.K. manufacturers of 500 W to 200 kW generators.

Pakistan. Wallem and Co. (Pakistan) Ltd., want to obtain agencies on commission or purchase basis from U.K. makers of electrical appliances, motors, cables and wires, insulating materials, diesel generating engines, transformers and transmission wireless equipment. Company is at 4, Bandukwalla Bldg, McLeod Rd, Karachi.

U.S.A. Mr Russ J. Gerde of the Russ J. Gerde Sales Co., 5649 Grand Ave So., Minneapolis, wishes to contact U.K. makers of unusual electrical appliances or materials. These could include electric clocks, lamps, glass items, display pieces, etc.

Quotations from U.K. manufacturers of switchgear for oil switches wanted by the Lewis Electrical Equipment Co., 5309 Germantown Ave, Philadelphia 44, Ratings from 50 MVA at 3·3 kV to 1500 MVA at 44 kV. Switches should be of drawout construction and vertical lift. Write to head of firm, Mr L. R. Lewis. He will be visiting U.K. in autumn.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

G. F. Gray and Sons Ltd., 94 Newton Rd, Rushden, Northants. Electricians, mechanical engineers, manufacturers of and dealers in electric apparatus, etc. Nom. cap.: £5,000. Dirs.: to be appointed by subs. Subs.: George F. Gray, 94 Newton Rd, Rushden; and Geoffrey F. Gray, 51 Roberts St, Rushden.

G. W. Cook and Sons (Kings Langley) Ltd., 11 High St, Kings Langley, Herts. Motor, electrician, radio and television engineers, etc. Nom. cap.: £3,000. Dirs.: A. G. Cook, D. A. Cook, and C. E. Ebbs.

Siba Electric Ltd. Distributors, suppliers and manufacturers and repairers of electrical and other equipment, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: D. Wisdom and J. N. Headlam, 28 Lincoln's Inn Fields, W.C.2.

A. J. Godden (Electrical) Ltd., 373 Archway Rd, N.6. Electronic and electrical manufacturers, etc. Nom. cap.: £1,000. Dirs.: A. J. Godden and Mrs M. A. Godden.

Patent Lighting Co., Ltd. To acquire whole or any part of undertaking, business and goodwill of Coast Lighting, Ltd; manufacturers of and dealers in lamps, etc., lit by gas, oil, electricity, etc. Nom. cap.: £50,000. Dirs.: to be appointed by subs. Subs.: A. H. Dodd, 30 Preston Drive, Wanstead, E.11; and M. Scott, 1 Bank Bldgs, Princes St, E.C.2.

Norman and Edwards (Products) Ltd., 18 Maddox St, W.1. All types of domestic and electrical equipment and appliances, general and mechanical engineers, etc. Nom. cap.: £1,000. Dirs.: J. Van Gelder, M. Dix. and Mrs L. Joseph.

Brierley Sons and Co. (Fans) Ltd., Stanley Rd Works, Stanley Rd, Chadderton, Lancs. To take over business of ventilating engineer carried on as "Brierley Sons and Co." at Chadderton, Lancs. Nom. cap.: £7,500. Dirs.: J. K. Brierley, J. E. Brierley, and C. W. Brierley.

John E. Beck and Co., Ltd. General, mechanical, electrical and motor engineers, etc. Nom. cap.: £3,000. Dirs.: J. E. Beck, and R. E. Woodcock.

Advanced Heating and Air Conditioning Co., Ltd., Pickmoss, Otford, Kent. Nom. cap.: £2,000. Dirs.: F. J. Whyte and Vera S. Whyte.

Ancoats Motor Co. Ltd., 4 Chapel Walks, Manchester, 2. Motor, mechanical, electrical and general engineers, etc. Nom. cap.: £100. Dirs.: V. A. Herring, and R. Lamprell.

Edona Ltd., 94 Arthur Rd, Wimbledon, S.W.19. Manufacturers of and dealers in electrical apparatus, appliances and fittings, radio and television apparatus, etc. Nom. cap.: £1,000. Dirs.: A. G. Lever and A. L. Larkworthy.

Farol Scientific Products Ltd., 19 Hawthorn Rd, Bognor Regis, Sussex. Research and development engineers; to manufacture and deal in substances, apparatus, instruments and equipment, and electrical, gas and mechanical appliances of all kinds, etc. Nom. cap.: £100. Directors: W. H. Oliver and P. A. T. Farrow.

Formby China Co. Ltd., 11 Chapel Lane, Formby. Manufacturers of and dealers in china, earthenware, hardware and chandlery, gas and electric fittings, etc. Nom. cap.: £1,000. Dirs.: W. Mather and R. Mather.

W. J. A. Spicer (Exeter) Ltd. Midland Bank Chambers, High St, Exeter. Radio, electrical, mechanical, motor and general engineers, etc. Nom. cap.: £5,000. Dirs.: W. J. A. Spicer and Mrs A. D. Spicer, and P. Williams.

Nuclear and Electronic Co. Ltd. 8 South Wharf, Paddington, W.2. Nom. cap.: £1,000. Dirs.: W. A. de Vigier and R. W. Gourdie.

E. Duckworth (Preston) Ltd. 106 Leyland Rd, Penwortham, nr. Preston, Lancs. Electrical engineers, general electrical installation contractors, lighting specialists and contractors, wireless and television engineers, etc. Nom. Cap.: £100. Dirs.: E. Duckworth and Mary E. Duckworth.

Harrison and Pinder Ltd. Balfour Hse, Finsbury Pavement, E.C.2. Neon and other sign makers, etc. Nom. cap.: £100. Dirs.: To be appointed by subs. Subs.: H. C. Rudolf and J. J. Nunes Vaz, Balfour Hse, Finsbury Pavement, E.C.2.

D. O. H. Coles Ltd. 13 Courtenay St, Newton Abbot. Manufacturers of and dealers in wireless and television sets and electrical goods of all kinds, etc. Nom. cap.: £4,000. Dirs.: D. O. H. Coles and Mrs G. M. Coles.

R. C. Yates Ltd. 1 High St, Cowley, Middx. To take over business of electrical television engineer carried on as "R. C. Yates" by Ronald C. Yates. Nom. cap.: £1,500. Dirs.: R. C. Yates and Mrs. M. I. Yates.

Dynacoolers Ltd. 46 Brook St, W.1. Manufacturers of and dealers in refrigerators, and to operate, sell, design and manufacture a machine for dispensing cool drinks through a refrigerator system, etc. Nom. Cap.: £100. Dirs.: W. H. S. Churchill and C. S. Schofield. Subs.: Jean Herbert and Claire Moore, 128 Albany St, N.W.1.

Gazette Announcements

COMPANIES ACTS

Millers (Hartlepools) Ltd. Resolution for voluntary winding-up passed at meeting on 30 June. H. Wood, C.A., Royal George Chambers, Victoria St, Bishop Auckland, was appointed liquidator, with committee of inspection.

Clifton Electrical Services Ltd. Meetings of members and creditors will take place at Rockingham Hse, Charles St, Rugby, on 18 Aug., at 3 p.m. and 4 p.m. resp., to receive liquidator's report.

BANKRUPTCY ACTS

Appointment of Trustee

Croydon. John F. Lighton, and Alexander White, trading together as Heathers, electrical dealers, at 737 Sidcup Rd, New Eltham, S.E.9, and 118 Old Dover Rd, Blackheath, S.E.3. Trustee is N. W. Osborne, C.A., 11-12 Finsbury Sq, E.C.2.

Intended Dividends

Croydon. Sidney D. Bennett, electrical engineer trading at 2 Burnt Ash Parade, Lee. Last day for receiving proofs, 27 July. Trustee is C. T. Newman, Official Receiver, 58-61 York Terr, Regent's Pk, N.W.1.

Banbury. Herbert F. Thorrington, electrical contractor of Eydon, Northants. Last day for receiving proofs, 31 July. Trustee is W. J. W. Hill, Official Receiver, 58-61 York Terr., Regent's Park, London, N.W.1.

Grimsby. Ernest S. Mellor, electrical engineer trading at 15 Cole St, Scunthorpe. Last day for receiving proofs, 31 July. Trustee is H. S. Bloomer, Official Receiver, 8 Flottergate, Gt. Grimsby.

First Meetings

London. Gilbert L. Searle, trading as electrical engineer at 309 Portobello Rd, W.10. Meeting at Bankruptcy Bldgs, Carey St, W.C.2, on 29 July at 11 a.m. Public examination at same address on 5 Oct. at 11 a.m. Date of receiving order, 9 July.

Brighton. Edward T. M. Marshall, trading as G.E.M. Radio Electric in High St, Hurstpierpoint. First meeting at Official Receiver's Office, 8 Old Steine, Brighton, on 23 July at 11 a.m., and public exam. at The Court Hse, Church St, Brighton, on 10 Sept., at 10.30 a.m.

Dividends

Sheffield. Frank E. V. Hooper, trading at 277 South Rd, Walkley, and as Hoopers Service Station at Walkley Rd, Walkley. Further supplemental dividends of 7s. 2d. in £ payable today (22 July) at Official Receiver's Office, 55 Queen St, Sheffield.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Electrovac. 726,081. Class 9. Suction cleaners, etc. Bylock Electric Ltd., 109 South St, Enfield, Middx.

Welcurb. 726,207. **Welmet.** 726,210. **Welvit** 726,211. Class Q. Electric resistances. Welwyn Electrical Laboratories Ltd., Trading Estate, Bedlington Station, Northumberland.

Edutape. 729,311. Class 9. Apparatus employing tape for recording, reproducing and amplifying electric oscillations. Wright and Weare Ltd, 131 Sloane St, S.W.1.

Portadyne. 729,849. Glass 9. Radiogramophones, gramophones, etc. Dynaport Radio and Television Ltd, Portadyne Works, 30/34 Gorst Rd, N.W.10.

Weyco. B726,905. Class 9. Scientific and electrical apparatus, etc. Weyco (Equipment) Ltd., 18/20 Dames Rd, E.7.

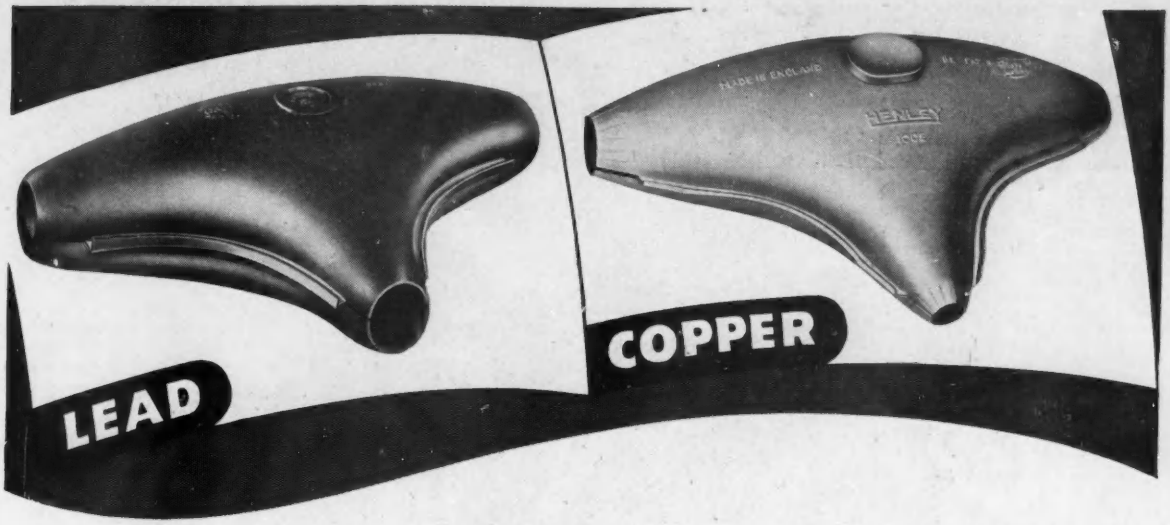
Torostat. 730,084. Class 9. Electrical resistors. Cressall Manufacturing Co. Ltd, 31/32 Lower St, Birmingham.

Selo. 730,359. Class 9. Measuring and signalling apparatus, etc. Teebee Manufacturing Co., Ltd., 205 Hook Rd, Surbiton, Surrey.

Chill Chaser. B727,542. Class 11. Heating apparatus and elements for immersion heaters, Remploy Ltd., 25/28 Buckingham Gate, S.W.1.

Paraglow. 728,911. Class 11. Space heaters. Premier Electric Heaters, Ltd., Premier Works, Keeley St, Birmingham 9.

Teelon. 730,181. Class 11. Lighting installations, etc. Benjamin Electric Ltd., Brantwood Works, Brantwood Rd N.17.



. . . WHICHEVER YOU PREFER

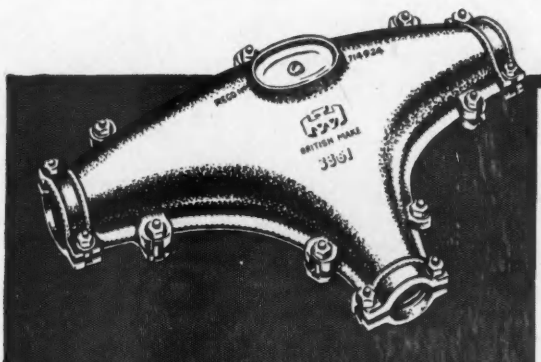
HENLEY LEAD SERVICE BOXES are pressed from extruded lead sheet. The two halves of the box have specially designed flanges. These form a joint that can be easily wiped, with the minimum amount of plumber's metal, and provide an effective seal. Ample space for jointing. Available in various sizes to take normal main and service cables.

HENLEY COPPER SERVICE BOXES are pressed from tinned copper sheet and are equivalent in design and sizes to the Henley Lead Boxes. The gland entries are scored to assist the jointer in "dressing down".

HENLEY

SERVICE BOXES

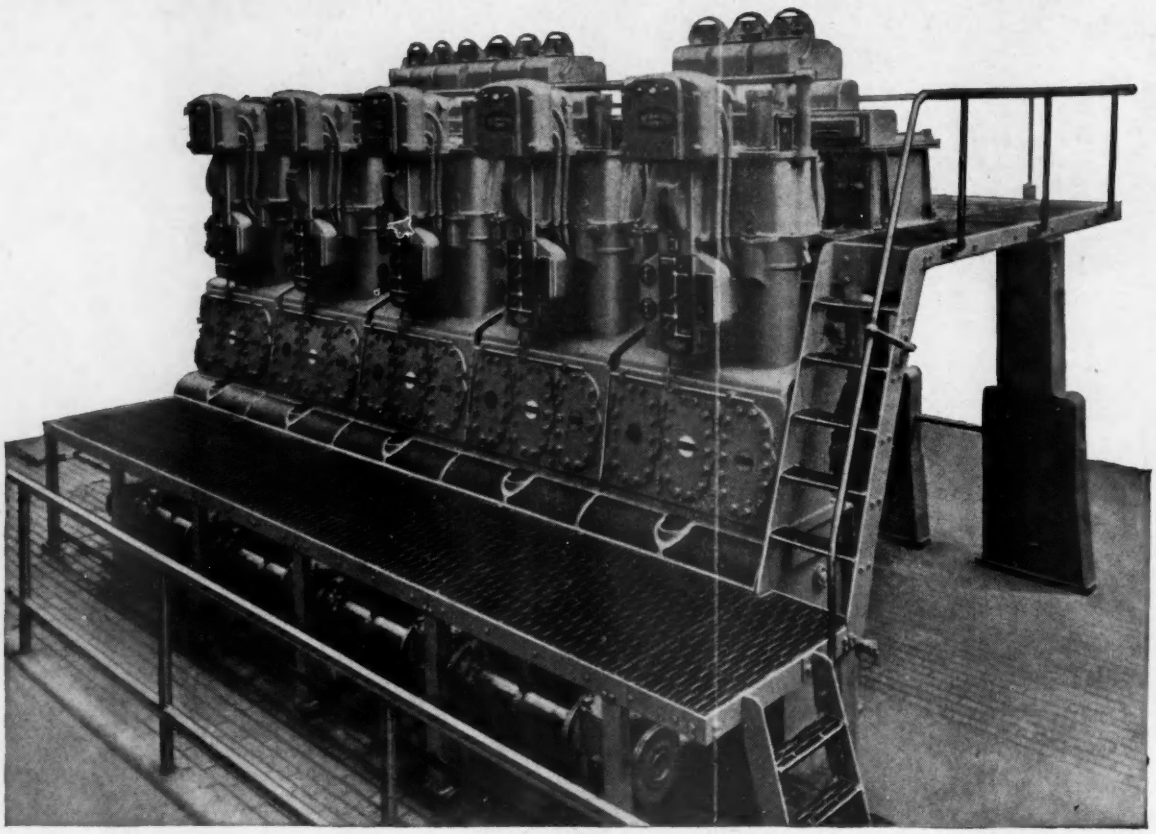
Write for Catalogue 26



HENLEY CAST IRON BOXES are suitable for use with the Lead or Copper Service Boxes. They provide ample mechanical protection.

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

SWITCHGEAR Type SB14



1000 MVA at 33 kV

Current capacity 400, 800 and 1,200 amps.
Fixed breaker gives compact layout and maximum economy in building space.
Phase segregated with complete earthed metal barriers between phases.
No insulation exposed to air. Condenser bushing busbars.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

Member of the A.E.I. group of companies

Leading Electrical Progress

F/B401

CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

TENDERS INVITED

CITY OF BELFAST
ELECTRICITY DEPARTMENT

TENDERS are invited for Replating Cells of Storage Battery at East Bridge St Station. Form of Tender and Specification (No. W.43) may be obtained at the Electricity Department, East Bridge St, Belfast, on payment of a deposit of One Guinea, which will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies may be obtained at half a guinea each; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each Tender, in sealed envelope marked "Tender for Replating Cells of Storage Battery, Electricity Committee" and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, 13 Aug., 1954.

An official receipt must be obtained for each Tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall,
Belfast.
15 July, 1954. (K 527)

COUNTY BOROUGH OF BLACKPOOL

TENDERS are invited for the supply of the following equipment for the Electrical Services Department:

127 Medium Class Tubular Steel Poles.
280 Cast Iron Bases (special castings).
280 Tubular Steel Double Arm Brackets.
280 Cast Finials.

The Corporation do not bind themselves to accept the lowest or any tender and reserve the right to accept tenders for the whole or any part of the equipment.

Specifications, drawings, forms of tender and general conditions are obtainable from the Illuminations and Public Street Lighting Officer, Electrical Services Department, Rigby Rd East, Blackpool. Separate tenders for each part of the Schedule are to be addressed to the undersigned and delivered in a plain sealed envelope to P.O. Box 11, Town Hall, Blackpool, in accordance with the instructions as stated on the Forms of Tender not later than 10 a.m. Tuesday, 10 Aug., 1954.

Signed TREVOR T. JONES,
Town Clerk.
(K 535)

COUNTY BOROUGH OF SWANSEA
Fforest Hall County Primary School, Swansea
TENDERS FOR ELECTRICAL INSTALLATION

FIRMS wishing to Tender for the Electrical Installation at Fforest Hall County Primary School to be erected at Fforest Hall, Swansea, are invited to submit their Applications to the Borough Architect, The Guildhall, Swansea, on or before Friday, 6 Aug., 1954.

Plans, Specifications and Conditions of Contract can be obtained on application

continued in next column

continued from previous column

and deposit of £2, provided the applicant gives satisfactory evidence of having previously carried out work of a similar character.

The deposit will be refunded after delivery of a bona fide Tender (which is not subsequently withdrawn) and the return of all documents.

No guarantee is given that the lowest or any other Tender will be accepted.

T. B. BOWEN,
Town Clerk.

The Guildhall,
Swansea,
14 July, 1954. (K 513)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD
Garry Project
ELECTRIC LIGHTING, HEATING AND OTHER SUBSIDIARY SERVICES FOR QUOICH POWER STATION

TENDERS are invited for the above installation. Copies of the Tender Document may be obtained on application, with cheque for Two Guineas (returnable), to the Engineers, Messrs Kennedy and Donkin, 12 Caxton St, London, S.W.1.

The Board do not bind themselves to accept the lowest or any Tender.

W. D. D. FENTON,
Secretary.

16 Rothesay Terrace,
Edinburgh 3.
15 July, 1954. (K 526)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18–64, *or a woman aged* 18–59; *unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order,* 1952.

SOUTH WEST SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the post of THIRD ASSISTANT ENGINEER (Planning and Development) (2) appointments in the Chief Engineer's Department. Applicants should have had works experience of manufacture and design of distribution plant and preferably have had some experience of the design, construction and operation of a 33 kV distribution system. A specialised knowledge of some branch of distribution engineering would be an advantage. Salary N.J.B. Schedule "C," AX/DX £649/£858 per annum.

The posts are superannuable. Applicants should possess a degree or equivalent qualification in Electrical Engineering and be Corporate Members of the Institution of Electrical Engineers.

Forms of application may be obtained from the applicants' appropriate officer or the undersigned, and should be returned to the undersigned not later than Saturday, 31 July, 1954.

J. MEEK,
Secretary.

62 Dalziel Drive,
Glasgow, S.1.
5 July, 1954. (K 435)

A CAREER AS A REGULAR ARMY OFFICER FOR QUALIFIED ENGINEERS

MECHANICAL, ELECTRICAL AND ELECTRONIC ENGINEERS are required as officers in the Corps of Royal Electrical and Mechanical Engineers.

There are two methods of entry. These are either:

(1) On a short service commission (which offers a good opportunity of obtaining a permanent commission) with a gratuity of about £100 for each completed year of service on leaving, or
(2) On a Permanent Regular Commission with a valuable pension and a terminal grant of £1,000 (tax free).

Candidates must be physically fit and not yet 29 years old, and have passed or be exempt from examinations of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers as required for graduates, or have a University degree in Natural Science or Engineering. In addition 2½ years' experience as an engineer (or 1½ years in the case of University graduates) is normally required.

The pay which Army officers may expect is according to the following table:

Rank	*Normal Age*	*If Single*	*If Married*
Lieutenant	23	£686	£831
Lieutenant	25	£723	£860
Captain	27	£860	£997
Major	34	£1,188	£1,325
Lt.-Colonel	42	£1,453	£1,581
Colonel	45	£1,791	£1,919
Brigadier	49	£2,065	£2,184

(Note.—This is the U.K. scale; there are various additions in certain overseas stations. In this table the figures of a single officer's pay include an element for food and accommodation which are normally provided in kind. This has been done to provide a direct means of comparison with civilian scales of pay.)

For further details please write to:
The War Office (AG1 (Officers) C), London, S.W.1, and quote this publication.
(K 450)

INSTRUCTOR IN GENERAL ELECTRICAL ENGINEERING

required by the MOMBASA INSTITUTE OF MUSLIM EDUCATION, KENYA, for one tour of 3 years in the first instance with prospect of further employment by mutual agreement. Salary scale (including present temporary allowance of £165/£300 a year) £715 rising to £1,324 a year. Commencing salary according to age, qualifications and experience. Outfit allowance £30. Contributory superannuation scheme. Free passages and free furnished quarters. Liberal leave on full salary. Candidates between 23 and 35 years should have served an appropriate apprenticeship and have wide subsequent practical experience including Outside Wireman's work. They must be capable of instructing in all forms of general electrical engineering both in theory and in practice, and should hold a C. and G. Certificate or equivalent qualification. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/30683/EE. (K 512)

BRITISH ELECTRICITY AUTHORITY
South Western Division

ASSISTANT ENGINEER (Combustion and Efficiency) required at Hayle Generating Station.

Superannuation scheme. Salary, N.J.B. Class "F," Grade 7, £697/£718.

Candidates should have had all round Station experience on boiler and turbine plant, be conversant with instrumentation and automatic combustion control. H.N.C. (electrical or mechanical) or equivalent an advantage.

Applications on Form A.E.6/ACT, obtainable from your place of employment or the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 3 Aug., 1954.

Previous applicants need not re-apply.
(K 524)

POWER STATION ELECTRICAL AND MECHANICAL ENGINEER

required for service with the SUDAN LIGHT AND POWER CO., LTD., in Khartoum, Sudan, as Deputy Power Station Superintendent. Basic salary on appointment within the range £E.1,500/£E.2,000 per annum according to qualifications and experience (£E.1=£1. 0s. 6d.). Candidates should be between the age of 30 and 45 years, and have had not less than 10 years experience in the construction and operation of modern power stations equipped with boilers and turbine alternator sets operating at not less than 400 p.s.i.g. and 750° F, and E.H.T. switchgear and associated control equipment. Experience with oil fired boilers, and also diesel alternators up to 1,200 kW of value. Evidence should be produced of having held positions of responsibility requiring organising and administrative ability. Initially duties will include the supervision of erection and commissioning of a steam power station equipped with two 5 MW steam turbine alternator sets.

Appointment will be on contract by arrangement up to 10 years, including a period of 12 months probation, with a bonus payable on completion of the contractual period. Free living accommodation with basic furniture or an allowance in lieu thereof will be provided. After satisfactory completion of the probationary period liberal leave on full salary with free passages. In addition to basic salary a cost of living allowance will be payable; and a kit allowance of £E.50 on appointment.

Applications stating age, education, qualifications, experience (with particulars of posts held), present appointment and salary with names of two references should be submitted to the Secretary, The Power and Traction Finance Company Limited, Queens House, Kingsway, London, W.C.2. (K 454)

MIDLANDS ELECTRICITY BOARD

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER required in the Stone District of the North Staffs Sub-Area.

Applicants should have had a sound technical training and experience in the preparation of wiring schemes and estimates for domestic, farm and industrial installations. Duties will include advice to consumers on supply matters and sales of domestic and farm equipment. Technical qualifications desirable. Salary £592/£610 per annum (N.J.B. D.8). Superannuable. Apply in writing within 10 days stating age, experience, etc., to District Manager, Midlands Electricity Board, High St, Stone, Staffs.

A. STEPHENS,
Secretary.
(K 520)

THE NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF DISTRICT ENGINEER, ROSSENDALE DISTRICT.

APPLICANTS should have had a sound training in electrical engineering and considerable experience in the operation and maintenance of high and low voltage networks (overhead and underground) and substations, the supervision of constructional work and the keeping of essential records of mains and substation equipment and layouts. The successful applicant will be responsible for the general maintenance of supply in the district.

Corporate membership of the Institution of Electrical Engineers will be an advantage.

Salary Scale: £941/£982 p.a. Grade E2. N.J.B. Conditions.

Applications to Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee St, Blackburn, by 31 July, 1954.

APPOINTMENT OF JOINTER (EXTRA HIGH TENSION) NEW MILLS.

Rate of Pay: 45d. per hour. N.J.I.C. Conditions.

Application forms can be obtained from the Sub-Area Manager, No. 7 Sub-Area, The North Western Electricity Board, Chapel St, Hazel Grove, Cheshire, and should be returned to him by 31 July, 1954. (K 498)

BRITISH ELECTRICITY AUTHORITY
Southern Division

APPLICATIONS are invited for the following posts:

S/13.552

THIRD ASSISTANT ENGINEER (MECHANICAL) CONSTRUCTION DEPARTMENT, MARCHWOOD GENERATING STATION SITE

Duties will be mainly concerned with the supervision of erection and commissioning of turbines, alternators, and auxiliary plant. Manufacturing works experience and practical experience in the mechanical aspects of generating station design or construction are desirable, and practical experience in plant erection will be an advantage. Applicants should preferably be corporate members of a recognised professional institution or hold qualifications leading to corporate membership.

Salary N.J.B. Grade 5, AX/CX, £649/£835.

S/13.553

BOILER HOUSE SHIFT CHARGE ENGINEER SOUTHAMPTON GENERATING STATION

Applicants should have had a sound mechanical training and experience in the design and operation of high pressure boiler plant, and should preferably possess technical qualifications admitting to corporate membership of a recognised professional institution.

Salary N.J.B. Grade F/9, £607/£629.

S/13.554

ENGINEER (GRADE 10), POOLE GENERATING STATION

The successful candidate may be called upon to perform the duties of a Station Shift Control Engineer, to assist on maintenance work, or to perform general station duties. Operating experience of modern generating station plant is essential.

Applicants should have had a sound technical training and should possess qualifications leading to corporate membership of an appropriate professional institution.

Salary N.J.B. H/10, £641/£667.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, should be returned by 6 Aug., 1954. (K 518)

UGANDA ELECTRICITY BOARD

APPLICATIONS are invited for appointments as CHARGE ENGINEERS on the permanent staff of the Board for duty at the Owen Falls Hydro-Electric Station. Applicants should have had a sound technical training and subsequent experience in the operation of generating stations.

Commencing salaries will be in the scale of £891/£1,161 per annum (including 35% temporary allowance) to be determined according to age and experience.

Free partly-furnished accommodation or allowance in lieu; free medical and dental treatment; three years' contract in first instance with leave thereafter on full pay; free passages for successful candidates and their families up to a maximum of 3 adult fares in each case.

Application forms and further information obtainable from the Board's London Office, 27 Regent St, S.W.1. Completed application forms should be returned to the London Office within two weeks of the appearance of this advertisement.

C. R. WESTLAKE,
Chairman.
Kampala, Uganda, East Africa. (K 504)

BRITISH ELECTRICITY AUTHORITY
Midlands Division

SHIFT CHARGE ENGINEER is required at Birchills Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule "A," Grade D7, commencing at £633 per annum.

A sound technical training and practical experience in the control and operation of steam generating plant and main switchgear are required. Appropriate qualifications an advantage.

Apply, quoting Vacancy No. 717MD, on form AE6, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 7 Aug., 1954. (K 515)

YORKSHIRE ELECTRICITY BOARD
No. 5 (Wakefield) Sub-Area

Barnsley District

SECOND ASSISTANT DISTRICT ENGINEER

APPLICANTS should be corporate members of the Institution of Electrical Engineers or hold equivalent qualifications. They must have had a sound practical training and extensive experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant and ancillary equipment, preferably in a large undertaking.

Salary—N.J.B. Class F, Grade 7, £697/£718 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 5 Aug., 1954.

No. 6 (Hull) Sub-Area

Bridlington and Goole Districts

THIRD ASSISTANT DISTRICT ENGINEERS (COMMERCIAL)

Applicants should have had a sound practical training in electrical installation work, and have an up-to-date knowledge of the utilisation of electrical appliances on farms. The successful applicants will be required to negotiate with consumers requiring electricity supplies, particularly in rural areas, and deal with estimates for installations, tariffs and sales development generally.

Candidates should be in possession of the Higher National Certificate in Electrical Engineering, or similar qualification.

The successful applicants will be required to reside in the district to which they are appointed.

Salary—Bridlington District:
N.J.B. Class D, Grade 9, £561/578 per annum.

Salary—Goole District:
N.J.B. Class E, Grade 9, £587/£600 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than 5 Aug., 1954. (K 502)

SOUTHAMPTON TECHNICAL COLLEGE

FULL-TIME TEACHER of Electrical Engineering Subjects to O.N.C. standard required by 1 Sept., or as soon after as possible. Salary Burnham Scale A (£415 x £18—£670) plus allowance for degree or equivalent. Forms and particulars from Chief Education Officer, Civic Centre, Southampton. (K 490)

BRITISH ELECTRICITY AUTHORITY
London Division

require an ELECTRICAL ENGINEER (Construction) in the Chief Generation Engineer's (Construction) Department.

Candidates should preferably be Corporate Members of the Institution of Electrical and/or Mechanical Engineers and have a detailed knowledge and wide experience of generating station electrical plant design, arrangement and construction. Experience in the operation and testing of modern plant is essential.

The successful candidate will be responsible for the technical supervision of electrical plant contracts for stations in the Division, including preparation of schemes and designs, specifications, analysis of tenders, etc., and technical supervision during site erection and testing.

Candidates should have held a similar position of responsibility in the Industry and be capable of administering the Electrical Section.

Salary provisionally within N.J.M. Scale 4, £1,650/£1,800 inclusive. Applications stating age, present position and salary, full particulars of qualifications and experience to D. Moffat, Director of Establishments, Winsley St, London, W.1, by 7 Aug., 1954. Quote reference ET/497. (K 503)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

THIRD ASSISTANT ENGINEER (TRANSMISSION)

APPLICATIONS are invited for the above post on the staff of the Chief Electrical and Mechanical Engineer at the Board's Head Office. Applicants should have technical education up to at least Higher National Certificate standard and should have constructional or operational experience of 132/33 kV substations and overhead lines.

Salary commencing at a point within the range £763/£899 (N.J.B. Schedule C, Class AX, Grade 4) depending on experience and qualifications. Superannuation Scheme applicable.

Application form obtainable from the Secretary, 16 Rothesay Terrace, Edinburgh 3, should be returned within 14 days of the appearance of this advertisement. (K 495)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

Chilterns Sub-Area Headquarters

2ND ASSISTANT ENGINEER (PLANNING AND DEVELOPMENT)

84/54.R.

Candidates should have had a wide experience in the design, layout and operation of urban and rural distribution systems comprising overhead and underground networks (including substations) at voltages up to and including 33 kV. They should be experienced in the preparation of distribution schemes including the technical design, specification and estimates. Corporate membership of the Institution of Electrical Engineers or the possession of a degree in electrical engineering will be an advantage.

Salary in accordance with Class L, Grade 7, of the National Joint Board Salary Agreement commencing at £926.

Apply to the Manager, Chilterns, Sub-Area, Eastern Electricity Board, Prebend St, Bedford.

Northmet Sub-Area Headquarters

JUNIOR ENGINEER

98/54.R

Candidates should have had a good general and technical education and possess the Higher National Certificate or equivalent qualifications. Previous experience in a Planning and Development office will be an advantage.

Salary in accordance with Class N, Grades 22-18, of the National Joint Board Salary Agreement within a range of £402/£544 plus London Allowance, commencing at a point dependent upon qualifications and experience.

Apply to the Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14.

Northmet Sub-Area

Enfield District

JUNIOR ENGINEER

97/54.R

Candidates should have had a good general and technical education and the possession of the Higher National Certificate of Electrical Engineering would be an advantage.

Salary in accordance with Class F, Grade 15, of the National Joint Board Salary Agreement commencing at £402 plus London Allowance.

Apply to the District Manager, Enfield Eastern Electricity Board, 40 Church St, Enfield, Middlesex.

Chilterns Sub-Area

Luton District

(*a*) 3RD ASSISTANT ENGINEER
(*b*) 2—GENERAL ASSISTANT ENGINEERS

99/54.R

Candidates should have had a sound technical training and experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems.

(*a*) Salary in accordance with Class G,

continued in next column

continued from previous column

Grade 9, of the National Joint Board Salary Agreement commencing at £641.

(*b*) Salary in accordance with Class G, Grade 11, of the National Joint Board Salary Agreement commencing at £573.

Apply to the District Manager, Luton, Eastern Electricity Board, 487 Dunstable Rd, Luton.

Future salaries and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications by letter, stating age, education, qualifications and experience with details of present appointment, should be submitted to the Managers concerned within 14 days of the appearance of this advertisement. (K 517)

SOUTH EASTERN ELECTRICITY BOARD

DEMONSTRATOR

Crawley District

SALARY £400 x £20—£480 x £10—£490 p.a. under N.J.C. Grade 1. Applicants should have showroom experience, be capable of demonstrating electrical appliances both in showrooms and on consumers' premises, and possess a recognised diploma or certificate in domestic science and the E.A.W. certificate.

Applications, naming 2 referees to F. A. Avery, A.I.E.E., District Manager, SEEBoard, 55 High St, Crawley, by 4 Aug., 1954.

FITTER (ELECTRICAL)

Croydon District

Wages 4s. 1d. per hour for 44-hour 5-day week under N.J.I.C. Agreement, for work in connection with erection and maintenance of 33 kV, 11 kV and 2·2 kV switchgear and transformers.

Applications, naming 2 referees to H. Lowe, M.I.E.E., District Manager, SEEBoard, Electric House, Wellesley Rd, Croydon, by 4 Aug., 1954.

A. L. BURNELL,
Secretary.
(K 523)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS invited for the following superannuable N.J.B. appointments:

STATION SHIFT CONTROL ENGINEER, LLANELLY POWER STATION

Vacancy No. 73

Salary Class E, Grade 10, £555/£569 per annum. H.N.C. and experience in power station control room desirable.

UPPER BOAT POWER STATION

1. ASSISTANT MAINTENANCE ENGINEER (MECHANICAL)

Vacancy No. 75

Salary Class H, Grade 9, £680/£706 per annum. H.N.C. and previous maintenance experience essential.

2. STATION SHIFT CONTROL ENGINEER

Salary Class H, Grade 10, £641/£667 per annum. H.N.C. and experience in power station control room desirable.

Application forms obtainable from Secretary, South Wales Division, British Electricity Authority, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 9 Aug., 1954. (K 519)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Edinburgh Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER N.J.B. Grade F.7. Salary £697/£718 per annum.

Applicants should have had wide experience in the operation and maintenance of underground distribution systems up to 33 kV.

Applications, stating age; qualifications, which should be not less than H.N.C. or equivalent; training; experience and present position, should be received by the undersigned within 14 days.

G. T. ALLCOCK,
Sub-Area Manager.

Dewar Place,
Edinburgh 3. (K 491)

BRITISH ELECTRICITY AUTHORITY RESEARCH

BRITISH Electricity Authority Research Laboratories, Leatherhead, require a GENERAL ASSISTANT ENGINEER with a university degree in electrical or mechanical engineering or in physics. Duties include testing, development and research work in the laboratories and in the field in connection with the generation, transmission and distribution of electricity. Salary N.J.B. Grade 5, £531/£732.

Forms from D. Moffat, Director of Establishments, Winsley St, London, W.1, to be returned by 7 Aug. Quote reference ET/481. (K 492)

BRITISH ELECTRICITY AUTHORITY

South East Scotland Division

SENIOR DRAUGHTSMAN (Mechanical) required for Generation (Construction) Department, Divisional Headquarters, Portobello.

Applicants should preferably have experience in the general layout of steam power stations, ships or heavy engineering plant in a contractor's drawing office. A good general and technical education, preferably to Higher National Certificate standard, is required.

Salary within scale £567/£671 (N.J.B. Schedule "D," Grade 5). Pension Scheme.

Applications, stating age and experience, to be submitted by 31 July, 1954, to Divisional Controller, British Electricity Authority, South East Scotland Division, British Electricity House, Portobello, Midlothian. (K 496)

BRITISH ELECTRICITY AUTHORITY

North West, Merseyside and N. Wales Division

VACANCY No. 123/54—DEPUTY POWER STATION SUPERINTENDENT, Stockport Generating Station. Salary £912/£951 (F.3).

Vacancy No. 124/54—DEPUTY POWER STATION SUPERINTENDENT, Huncoat Generating Station, near Accrington. Salary £912/£951 (F.3).

Apply, quoting vacancy No. to Controller, British Electricity House, 825 Wilmslow Rd, Manchester 20, before 31 July. (K 507)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

APPLICATIONS are invited for the following appointments:

STATION CHEMIST—MEXBOROUGH POWER STATION

(Ultimate Capacity 120 MW)

Salary Range £697/£718 per annum. Class F, Grade 7, National Joint Board Agreement.

Applicants should hold a Higher National Certificate in Chemistry and have had experience of the testing and analysis of fuels, waters and oils. Previous power station experience is desirable, especially with regard to modern water treatment plant.

SECOND ASSISTANT STATION CHEMIST—HUDDERSFIELD POWER STATION

Salary Range £548/£565 per annum. Class F, Grade 11, National Joint Board Agreement.

Applicants should hold a Higher National Certificate in Chemistry and have had previous experience in the testing and analysis of fuels, waters and oils.

Application Forms obtainable from the Divisional Secretary (Establishments) British Electricity House, St. Mary's Rd, Leeds 7, to be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
(K 522)

ELECTRICAL ENGINEERING ASSISTANTS

required with experience of installations in large buildings or of lift practice. H.N.C. (Elec.) or O.N.C. (Elec.) preferred. Salaries within range £300/£739. Application form from Chief Engineer (54/36), London County Council, County Hall, S.E.1, returnable within next 14 days. (Enclose S.A.E.) (939). (K 506)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or C. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for posts (*a*) and Corporate Membership for post (*b*) an advantage.

(*a*) GENERAL ASSISTANT ENGINEERS (EFFICIENCY AND TESTING) DIVISIONAL AND GROUP 2 HEADQUARTERS

Vacancy No. 54/586

Good technical education necessary with experience of the testing and/or operation of the mechanical plant in power station. Salary—Class AX/EX, Grade 8=£526. 1s./£749. 14s. p.a.

(*b*) THIRD ASSISTANT ENGINEER (COMMUNICATIONS SECTION) TECHNICAL DEPARTMENT, DIVISIONAL HEADQUARTERS

Vacancy No. 54/587

Successful candidate will be based at Westminster, S.W.1. The section is responsible for the Construction, Testing and Maintenance of a Private Communications System owned and maintained by the Authority, using line, teleprinter and radio equipment and techniques. Previous experience on this class of apparatus is essential, and telephone manufacturer's works experience desirable. The Engineer appointed will be directly responsible to the Communications Engineer and deputise for him in his absence. Preference will be given to candidates educated to University Degree standard, preferably in Physics or Light Current Electrical Engineering and with administrative experience. Commencing salary in range £801. 3s./£943. 19s. with ultimate progression to £1,053 in accordance with Class AX/EX, Grade 4.

(*a*) ASSISTANT ENGINEER (EFFICIENCY AND TESTING) FULHAM GENERATING STATION

Vacancy No. 54/588

Knowledge of Thermodynamics and Combustion necessary. Salary—Class L, Grade 11=£752. 17s. p.a.

(*a*) JUNIOR ENGINEERS

Vacancy No. 54/560

Junior Engineers required at various power stations in the London Area. Excellent opportunities for training and promotion to higher grades. Salary and conditions of service in accordance with N.J.B. Agreement.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, British Electricity Authority, London Division, Generation House, Great Portland St, W.1, and be received within 14 days of this advertisement. (K 511)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

ASSISTANT SHIFT CHARGE ENGINEERS, DRAKELOW POWER STATION

Vacancy No. 102/54/ET

Applicants must have technical qualifications up to H.N.C. standard and have received a sound engineering training followed by operating experience with large capacity High Pressure Plant, preferably in conjunction with P.F. Boilers.

Salary for this appointment will be within Class J, Grade 9 (£719/750 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 26 July, 1954.

ASSISTANT ENGINEER (COAL AND ASH PLANT), DRAKELOW POWER STATION

Vacancy No. 103/54/ET

Applicants must have wide experience of operation and maintenance at a large Power Station employing P.F. Boiler Plant.

Candidates should have suitable technical qualifications admitting to Corporate Membership of the Institution of Mechanical Engineers and/or the Institution of Electrical Engineers.

continued in next column

continued from previous column

The successful applicant will be responsible to the Station Superintendent for the programming of coal traffic and for the operation of the coal and ash plants.

Salary for this appointment will be within Class J, Grade 8 (£764/£796 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 26 July, 1954.

DRAUGHTSMEN, TRANSMISSION DEPARTMENT, DIVISIONAL HEADQUARTERS

Vacancy No. 105/54/ET

Draughtsmen are required in the Transmission Department at this Divisional Headquarters. Experience on the design and construction of H.V. substations or overhead transmission lines an advantage.

Salary, according to experience and ability, within Grade 6 (£433/£567 per annum) or Grade 5 (£567/£671 per annum) of Schedule D of the National Joint Board Agreement.

Closing date for receipt of applications, 26 July, 1954.

SHIFT CONTROL ENGINEER, WARWICK POWER STATION

Vacancy No. 107/54/ET

Applicants should have had some experience in Power Station Control and have O.N.C. in Electricity.

Salary for this appointment will be within Class E, Grade 10 (£555/£569 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 5 Aug., 1954.

JUNIOR ENGINEERS, STAYTHORPE POWER STATION

Vacancy No. 108/54/ET

Junior Engineers are required at Staythorpe Power Station, where suitable young engineers will be given opportunity to obtain operating and maintenance experience in the various sections of this large Generating Station operating at 900°/900 lb sq in. steam conditions.

Salary for this appointment will be within Class J, between Grades 17 and 14 (£424/£545 per annum) of the National Joint Board Agreement, according to qualifications and experience.

Preference will be given to candidates who hold the Higher National Certificate, or who are at present pursuing a course of study with the object of obtaining this or a similar qualification.

Closing date for receipt of applications, 5 Aug., 1954.

These appointments will be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.

16 July, 1954. (K 525)

THE SOUTH WEST SCOTLAND ELECTRICITY BOARD

Clyde Sub-Area

2ND ASSISTANT DISTRICT ENGINEER required for Greenock District. Salary scale N.J.B. Agreement, Class E, Grade 7, £649/£681 per annum. The post is superannuable.

Applicants should preferably be Graduates of the Institution of Electrical Engineers or hold equivalent qualifications and have experience of H.V. and L.V. overhead and underground distribution systems.

Applications should be forwarded to the undersigned, The South-West Scotland Electricity Board, Clyde Sub-Area, 206 St Vincent Street, Glasgow C.2, not later than Wednesday, 28 July, 1954.

DANIEL ROSS,
Manager.
(K 514)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

SHIFT CHARGE ENGINEER—Brighton "A" Power Station. Applicants should have had sound technical training together with extensive experience in the operation of modern high pressure turbine and boiler plant, E.H.T. switchgear and in the control of labour. P.F. experience an advantage. N.J.B. Conditions of Service. Class H, Grade 7, £772 p.a. Applications giving details of education, present position, experience, etc., should be received by the Station Superintendent, Brighton Power Station, Portslade-by-Sea, Sussex, by 31 July. (K 521)

THE NORTH EASTERN ELECTRICITY BOARD

Wear Sub-Area

APPLICATIONS are invited for the appointment of SECOND ASSISTANT DISTRICT ENGINEER, Crook District. Salary, Schedule "A," Class D, Grade 7, £633/£643. N.J.B. conditions of service.

Applications stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North-Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement. (K 516)

JOHNSON & PHILLIPS LIMITED

STAFF FOR SOUTH AFRICA

Johnson and Phillips Limited require the following Staff for their South African Branch:

1. CHIEF DRAUGHTSMAN.
   Candidates must have good technical and practical qualifications, in addition to experience with leading switchgear manufacturers both in design and contract work.
2. SENIOR SWITCHGEAR DRAUGHTSMAN.
   Candidates must have good technical and practical training, in addition to experience with leading switchgear manufacturers. Some experience in switchgear design is essential.
3. TECHNICAL SALES ENGINEER.
   Candidates should have a technical background, preferably not less than Higher National Certificate level, and experience in preparing tenders for switchgear up to 33,000 V.
4. TECHNICAL SALES PROMOTION ENGINEER.
   Candidates should have a sound technical background, a pleasing personality and experience of outside representation among buyers and consultants. Successful candidate will operate from Johannesburg but may be expected to travel in the Northern part of the Union of South Africa, although most of his contacts will be in and around Johannesburg.

These appointments are for permanent situations at the J. and P. Switchgear Works at Driehoek, Johannesburg, where switchgear up to 11,000 V is manufactured, and enquiries for gear up to 66,000 V are handled. In all cases preference will be given to men between 28 and 38 years of age. Salaries will be in accordance with qualifications and experience and good bonus and life assurance schemes are in force. Applicants should clearly state for which post they are applying and state age, experience and salary required. Applications should be addressed to the Employment and Welfare Manager, Johnson and Phillips Limited, Charlton, London, S.E.7. (K 508p)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2.

RESEARCH AND DEVELOPMENT

The J. Stone Group of Companies, which has extensive and expanding interests in electrical and mechanical engineering, offers Permanent Positions on its Research and Development Staff to:

(a) DESIGN AND LABORATORY ASSISTANTS for development of light electrical and mechanical equipment, with prospects of advancement later to technical or sales staff overseas. Previous design experience not essential, but applicants should be of degree standard, and have had works experience.

(b) SENIOR DRAUGHTSMEN dealing with light mechanical and electrical equipment, especially dynamo-electrical machinery, automatic control gear, and mechanical drives. Works experience essential. O.N.C. or H.N.C. preferred.

Applications in first instance giving full details training, etc., to:

Personnel Manager,
J. Stone and Co. (Deptford) Ltd.,
Arklow Road, London, S.E.14.

(K 385p)

ALKALINE BATTERIES LTD., of Redditch, are the largest makers in the Empire of Alkaline accumulators, miners' lamps and emergency lighting systems, which are in rapidly growing use particularly for export. The company has vacancies in its Technical Sales and Development Sections for Graduate ELECTRICAL ENGINEERS, not over 30 years of age, or for men nearing the end of their Degree Course who have completed National Service. The posts are pensionable and offer the prospect of executive rank. Applications with full educational details and experience should be addressed to Commercial Manager, Alkaline Batteries Ltd., Union St, Redditch. (K 23)

ELECTRICAL RESEARCH AND TESTING ENGINEERS

A. REYROLLE AND CO. have a number of vacancies for engineers to be engaged on ELECTRICAL RESEARCH and LABORATORY TESTING in connection with switchgear, protective gear, insulation, etc. For certain of the vacancies an Honours or Pass Degree is required; for the others a Higher National Certificate is adequate. The work will be varied and interesting and there will be good scope for advancement. Starting salaries in accordance with age, technical qualifications and experience. Apply with full particulars to the Chief Engineer, A. Reyrolle and Co., Ltd., Hebburn, Co. Durham. (K 475p)

PUBLIC RELATIONS OFFICER

required for large Engineering Organisation in Midlands. Practical experience in Industrial Publicity essential. Good prospects for man of managerial calibre. Age about 35/40. Particulars and salary required to—Box 3691, Electrical Times. (K 500p)

A WELL-KNOWN electrical company has a vacancy for a senior SALES ENGINEER based on their London office. The successful applicant must be a trained electrical engineer with Ordinary National Certificate as a minimum qualification and with previous experience in the London or South Eastern counties area. The post carries a responsibility for the organisation and control of three sales engineers. A generous salary is offered together with non-contributory pension scheme.—Box No. 3677, Electrical Times. (K 480)

DRAUGHTSMAN for Lighting Fittings Design. Some experience of estimating an advantage. Reply in confidence giving fullest details of training and experience, stating age and salary required to R. and A. G. Crossland Ltd., Cartbridge Lane, Walsall. (K 493)

ELECTRICAL DRAUGHTSMAN for London office with experience Power and Substations layouts and diagrams. 5-day week; free luncheons; Pension Fund. Write Box E.T.994, c/o 191 Gresham House, E.C.2. (K 505)

ELECTRICAL AND MECHANICAL DRAUGHTSMAN wanted for manufacturing Electrical Engineers, West London District, state age, experience and salary.—Box No. 3669, Electrical Times. (K 416)

ELECTRICAL CONTRACTORS, nationally known, require MANAGER for their Glasgow branch which is rapidly expanding. Applicant should have thorough training in electrical contracting industry and have held positions of responsibility. Estimating experience an advantage. This post offers excellent opportunities of promotion. Apply, stating training, experience and age to—Box No. 3703, Electrical Times. (K 536)

INDUSTRIAL Lighting Fittings Manufacturers Midland area, require a man with DRAWING OFFICE experience, able to handle enquiries, estimating, etc., in preparation for manufacture. Good prospects. Give particulars of experience and salary required.—Box No. 3689, Electrical Times. (K 494)

INDUSTRIAL, Electrical and Mechanical Repair Specialists require a young ENGINEER REPRESENTATIVE for the London District. Applications in confidence to: London Sales Manager, Dowding and Mills Ltd., 26 White Post Lane, London, E.9. (K 413)

JUNIOR DRAUGHTSMEN required by manufacturers of medium voltage switchgear. 5-day week and superannuation scheme. State age, technical qualifications, and salary required to Ottermill Switchgear Ltd., Ottery St. Mary, Devon. (K 501)

LAYOUT DRAUGHTSMEN required by Consulting Engineers for electrical layout work including H.V. and L.V. outdoor substations, indoor switchgear and cable diagrams.

Applicants should possess or should be studying for H.N.C. or equivalent. Salary in accordance with qualifications. Apply in writing reference KJB/RFS to Messrs Kennedy and Donkin, 12 Caxton St, Westminster, London, S.W.1. (K 378)

MAINTENANCE ELECTRICIANS required for Steel Works Plant in Cardiff. Knowledge of automatic control gear for A.C. and D.C. motors essential. Must be members of E.T.U. Day work on 44-hour week but prepared to work shifts on 48-hour week.—Box No. 3693, Electrical Times. (K 509)

THE ENGLISH ELECTRIC CO., LTD.

Appointments are available with The English Electric Co., Ltd., on important work covering Application Engineering on all classes of electrical equipment. These appointments are pensionable after a qualifying period and apprentice-trained men with Higher National Certificate in Electrical or Mechanical Engineering or equivalent, and with previous experience on Application work are preferred.

Experience in the manufacturing or power supply industries or in the application or installation of electrical equipment in any branch of industry or engineering is an alternative qualification and professional engineers in these fields are also invited to apply.

A number of vacancies also exist for apprentice-trained engineers seeking an opportunity of acquiring Application Engineering experience. Reply stating age, experience, qualifications and quoting Ref. S.A.33C to Dept. C.P.S., 336/7 Strand, W.C.2. (K436p)

OUTSIDE SALES ENGINEER required by company manufacturing electrical rotation machinery one to 100 h.p. The successful applicant will be based at Loughborough, Leics, and will have to cover the East Midlands area. Possession of Ordinary National Certificate in Electrical Engineering is a necessary qualification and previous experience of this range of products is essential. Salary dependent upon qualifications and experience. Non-contributory superannuation scheme.—Box No. 3675, Electrical Times. (K 479)

POST GRADUATE APPRENTICESHIPS. Prominent Switchgear Manufacturing Company invites applications from young engineering graduates for a two-year course of training with interesting posts in Designs, Development, Sales and Contract work available on completion. Applicants should have obtained a university degree in electrical engineering or technical college diploma of equivalent standard. Applications from men who have completed their National Service will receive special consideration. Full information may be obtained from the Personnel Manager, Ferguson Pailin Ltd., Higher Openshaw, Manchester 11. (K 528)

PURCHASING MANAGER required for company manufacturing light electrical goods and control gear. Age between 30-40 years. Apply stating qualifications, experience and salary required.—Box No. 3697, Electrical Times. (K 531)

DESIGN ENGINEER

An EXCEPTIONAL OPPORTUNITY exists in SOUTH EAST LONDON for a DESIGN ENGINEER with sound theoretical knowledge and recent industrial experience in the design of A.C. and D.C. machines, and low voltage control gear. This appointment offers rapid advancement to a position of superior technical and administrative responsibility. The salary will be commensurate with the requirements.

Applications giving full details of training and experience should be sent to:

Box 2 V G 7249, A.K. Advg.,
212a Shaftesbury Ave, London, W.C.2.

(K 384p)

MECHANICAL ENGINEER

with good technical qualifications required for 80 MW industrial power station. Age not less than 30. Commencing salary £950 to £1,000, with generous non-contributory pension scheme. Up-to-date and responsible power station experience essential. Apply in writing to Salaried Personnel Department, Ford Motor Company, Limited, Dagenham, Essex, quoting reference PHE. (K 370p)

PIRELLI-GENERAL CABLE WORKS LTD. have SALES DEPARTMENT Staff vacancies for General Correspondence and preparation of Mains Cable Tenders. Apply in writing to Paper Cable Sales Department, Leigh Rd, Eastleigh, Hants. (K 530)

POWER STATION ATTENDANT required for heavy Industrial Plant in Cardiff. Applicants should have maintenance experience on large electrical machines and preferably a knowledge of H.T. Distribution Systems. Must be members of E.T.U. Day work on 44-hour week but prepared to work shifts on 48-hour week.—Box No. 3695, Electrical Times. (K 510)

REPRESENTATIVES with established connections required to promote new and first-class electrical domestic equipment. Car owners essential. Must be able and willing to work hard. Full support given. Write full particulars to: Napper, Stinton, Woolley Ltd. (BPD), 14-19 Gt. Chapel St, London, W.1. (K 417)

SALES ENGINEERS, D.C. and A.C. Motors and Control Gear, required London, Manchester, and Birmingham areas. Outside sales experience essential. Apply—Box No. 3681, Electrical Times. (K 482)

SANDERS, WEDNESBURY, LONDON OFFICE. There is a vacancy for a SALES ENGINEER for the London Area. Applicants should preferably be of O.N.C. or H.N.C. standard and have completed National Service. Full details by letter please to Head Office, Ridding Lane, Wednesbury, Staffs. All applications will be treated in confidence and acknowledged. (K 499)

SHIFT CONTROL ENGINEER required by the Steel Company of Wales Limited (Steel Division), at their Margam Power Plant.

Applicants should possess evidence of advanced technical training and have knowledge of the operational control of H.T. interconnected network, together with some experience in turbine and boiler operation.

Higher National Certificate or equivalent desirable.

Salary £775 per annum according to qualifications and experience.

Those wishing to apply should write for official Application Form to the Personnel Superintendent, The Steel Company of Wales Limited, P.O. Box No. 3, Port Talbot. (K 476)

ELECTRICAL ENGINEER

wanted (aged 30-40, preferably Chartered) to assume leading position—commanding equivalent £1,000 p.a. to start—in Design Office of London Company manufacturing automatic precision machinery. Previous drawing office and industrial experience of control gear and mechanisms essential. Apply—Box No. 3683, Electrical Times. (K 485p)

TRANSFORMER ERECTORS AND BENCH ELECTRICAL FITTERS Wanted, used to first class repairs work. Apply, Dowding and Mills Ltd., 24-26 White Post Lane, Hackney, London, E.9. (K 529)

YOUNG QUALIFIED ELECTRICAL ENGINEER with commercial experience required for electrical contractors in Salisbury, Southern Rhodesia. Work includes contracting sales and will lead to partnership for right man. Starting salary £80 per month plus bonuses. Passage paid. House available. Apply with details of age, married state, qualifications and experience to Davis and Soper Ltd., 52 and 54 St. Mary Axe, London, E.C.3. (K 533)

APPOINTMENTS WANTED

AUSTRALIAN ELECTRICAL SALES REPRESENTATIVE, now in U.K., seeks agencies English manufacturers industrial switch, fusegear, electrical accessories, domestic appliances, etc. Contacts manufacturers, wholesalers, retailers. F. T. Welsh, 52 Chatsworth Rd, Morecambe, Lancashire. (K 444)

WANTED

WANTED, D.C. and A.C. ball-bearing MOTORS, motor generator sets, dynamos and alternators.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London, N.1. (K 3)

WANTED. ROTARY CONVERTERS, any size.—Universal, 221 City Rd, London, E.C.1. (K 4)

WANTED, for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady St, Bethnal Green, E.1. (K 1)

WANTED, HOOVER HOTPOINT, etc. vacuums suitable reconditioning, also washing machines.—Box No. 3699, Electrical Times. (K 532)

WORK WANTED

ARMATURE REWINDING service to the trade. Vacuums, Drills, Grinders, Hood Dryers, Dental Motors. Vacuum cleaner and drill armatures replaced from stock 24-hour service. Every job guaranteed. All vacuum cleaner parts, hoses, etc., in stock for any make. Apex washer agitator shafts stocked.—Regam Electric Cleaner Service, 95 Park Lane, Leeds 1. (K 15)

ELECTRIC CLOCKS repaired. Quick service. 12 months' guarantee. J. W. Hughes, 3 St. Thomas' St, London Bridge, S.E.1. (Tel. HOP 2759). (K 488)

A.C. and D.C. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (K 10)

FISHER FOUNDRIES LTD., Greet, Birmingham 11, for Machine Moulded Precision Castings in gun metal and soft grey iron. Tel.: Victoria 0197. (K 18)

WORK WANTED. Capacity available for all types of COIL WINDING.—Box No. 2425, Electrical Times. (K 13)

FOR SALE

A.C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 5566-9. (K 6)

A.A. ELECTRICAL CO. for A.C.-D.C. MOTORS, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—Chi. 5105, 67 Rothschild Rd, W.4. (K 5)

FLAMEPROOF MOTORS, M.G. SETS, D.C. MOTORS, GEARED MOTORS, A.C. MOTORS, TRANSFORMERS, CONTROL GEAR. SPECIALS. FLANGE MOTORS

ELECTROPOWER COMPANY LIMITED

Kingsbury Works, Kingsbury Rd, London, N.W.9
Tel.: COLindale 4621/3,
Grams: Lectropowa, Hyde, London (K9p)

A HIGH VACUUM IMPREGNATION UNIT or single or batch coil impregnation service to R.I.C. Specification 214 or individual requirements. — Blickvac, 505 Lordship Lane, S.E.22. Tel: Forest Hill 7089. (K 14)

A.C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works Ltd., Milo Rd, East Dulwich, S.E.22 (Forest Hill 2278-9). (K 2)

DON'T worry about your electricity bills. Fit 1s. slot electric meters for hotels, bed-sitters, etc. Prices from 50s.—Selectrics, Department E.T., Castle Circus House, Torquay. Tel. 7218. Trade inquiries invited. Trade discount. (K 16)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Rd, London, E.C.1. (K 7)

MERCURY SWITCHES are made by Hall, Drysdale and Co., Ltd., of 58 Commerce Rd, Wood Green, London, N.22. Tel.: BOW. 7221. (K 8)

PRACTICALLY new electric mains supply TRANSFORMER for sale. "EEC" 200 kVA Portable step down transformer 10,750 V—400 V., 300 amps, 50 cycles and oil immersion circuit breaker with main switch. Hire Purchase facilities may be made available if required. Reply to Castos Ltd., Wellington, Shrops. (K 497)

PURLEY CHOKES AND BALLASTS. Our 80-W tapped h.p.f. ballast with starter switchgear-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. W. Blanshard Ltd. (Dept. E.T.), Purley, Surrey. Uplands 4818-9. (K 11)

TIME SWITCHES for sale. Reconditioned or new. 12 months' guarantee. Immediate delivery. List from: J. W. Hughes, 3 St. Thomas' St. London Bridge, S.E.1. (Tel.: HOP 2759.) (K 21)

HUNDREDS OF MOTORS IN STOCK

1, 2, and 3-ph. and D.C. all sizes Geared Motors, M.G. Sets and special equipment made up. Rewinds and redesigns all sizes. 12 months' guarantee on all supplies and rewinds. Lists sent on request.

EDWARDS, WYATT & COURT LTD.
Grant Street, London, E.13. Grangewood 3697

AGENCIES

OLD established manufacturers of Switchgear Accessories require TECHNICAL SALES REPRESENTATIVE for Birmingham, Manchester and Glasgow areas, to handle their goods in conjunction with existing agencies of, say, motors, transformers, switches, etc.

Write in confidence, giving particulars and Agencies already held.—Box No. 3701, Electrical Times. (K 534)

PROVINCIAL Lampshade Manufacturers require AGENTS all areas calling on wholesale trade. Full support given.—Box No. 3565, Electrical Times. (K 164)

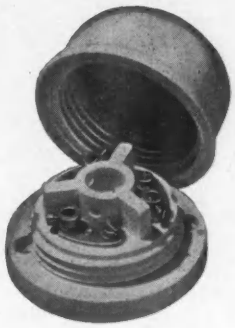
MISCELLANEOUS

CITY AND GUILDS (Electrical, etc.) on "No Pass—No Fee" terms. Over 95 per cent successes.—For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook FREE and post free.—B.I.E.T. (Dept. 39), 29 Wright's Lane, London, W.8. (K 12)

Further Illustrations

From our range of over 300

ELECTRICAL ACCESSORIES



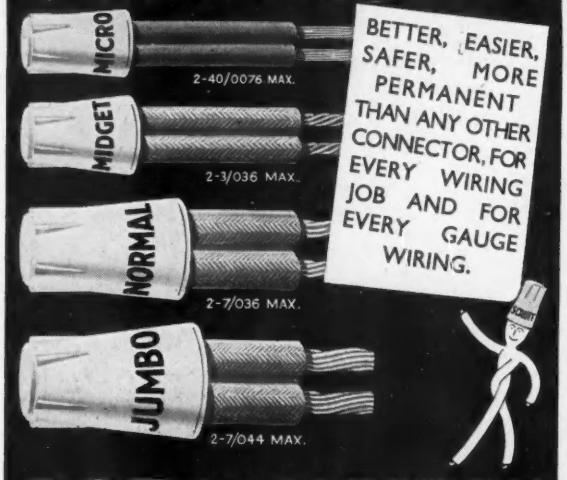
Porcelain Ceiling Rose

Top Entry
Porcelain Switched
Socket

CLANG
REGISTERED TRADE MARK

CRICKLEWOOD - LONDON
'Phone Gladstone 4201—P.B.X. Board

For Every Gauge
IN EVERY WIRING INSTALLATION



SCRUIT
REGISTERED TRADE MARK
BRITISH MADE, ONE PIECE PORCELAIN CONNECTORS

MADE BY V.G. PORCELAIN CO., LTD.
GORST RD., PARK ROYAL, LONDON, N.W.10. Telephone: ELGAR 7362

Distributors: S. O. Bowker Ltd., GEE (Birmingham) Ltd., Birmingham and Metway Ltd., Brighton

FOR FARM & FACTORY WIRING

THE NEW

GILFLEX

FARM & INDUSTRIAL
PLASTIC CONDUIT
WIRING SYSTEM

★ ALL-INSULATED ★
★ NON-INFLAMMABLE ★
★ CORROSION RESISTANT ★
★ WATERTIGHT ★

GILFLEX CONDUITS LTD
41 THE PARADE, HIGH STREET
WATFORD · HERTS
WATFORD 3422

INDEX TO ADVERTISERS

Aidas Electric Ltd. 34
Aluminium Union Ltd. 11
Auchterlonie, Chas., & Co. Ltd. ... 64

Backer Electric Co. Ltd. 12
Benjamin Electric Ltd. 5
Bill Switchgear Ltd. 3
British Driver-Harris Co. Ltd. 16
British Electric Resistance Co. Ltd. ... 62
British Insulated Callender's Cables Ltd. ... ... *Cover* (i)
British Power Transformer Co. Ltd. ... 18
British Thomson-Houston Co. Ltd. ... 13
Brook Motors Ltd. 9
Brush Electrical Engineering Co. Ltd. 23, 36
Burgess Products Co. Ltd. 54

Cable Makers' Association 68
Carter, B. & F., & Co., Ltd. 60
Cayson Electrics Ltd. 64
Channel Conduits Ltd. 54
Clang Ltd. 49
Connollys (Blackley) Ltd. 39
Counting Instruments Ltd. 36
Critchley Bros. Ltd. 62
Crockatt,W., & Sons Ltd. 26
Crompton Parkinson Ltd. 59

Dorman & Smith Ltd. 52

Edison Swan Electric Co. Ltd. 15
Electrical Times Ltd. 62
English Electric Co. Ltd. 19
Erskine, Heap & Co. Ltd. 4
Everett Edgcumbe Ltd. 27
Evershed & Vignoles Ltd. 20

Fawcett, Preston & Co. Ltd. 7
Ferranti Ltd. 22

Geipel, Wm., Ltd. 60
General Electric Co. Ltd. ... 21, 55
Genristo Ltd. 52
Gilflex Conduits Ltd. 49
Gledhill-Brook Time Recorders Ltd. ... 32
Glover, W. T., & Co. Ltd. 67
Grey & Marten Ltd. 32

Hackbridge & Hewittic Electric Co., Ltd. 63
Henley's, W. T., Telegraph Works Co., Ltd. 41
Hick Hargreaves & Co. Ltd. ... *Cover* (iv)
Hoover Ltd. 40
Horstmann Gear Co. Ltd. 2

Johnson & Phillips Ltd. 28

Key Engineering Co. Ltd. 34

Laurence, Scott & Electromotors Ltd. 1
L.P.S. Electrical Co. Ltd. 58

Martindale Electric Co. Ltd. 64
Meritus (Barnet) Ltd. 66
Mersey Cable Works Ltd. 25
Metallic Seamless Tube Co. Ltd. ... 58
Metropolitan-Vickers Electrical Co. Ltd. 30, 42
Midland Coil Winding Co. Ltd. ... 34
Midland Electric Manufacturing Co. Ltd. 51
M.K. Electric Ltd. 29

Nettle Accessories Ltd. 64
New-Day Electrical Accessories Ltd. ... 26

P & B Engineering Co. Ltd. 66
Pinchin Johnson & Co. 50
Power Petroleum Co. Ltd. 65
Premier Cooler & Engineering Co., Ltd. 56
Process Control Gear Ltd. 2
Pyrotenax Ltd. 33

Revo Electric Co. Ltd. 31
Rotunda Ltd. 56

Sanders, Wm., & Co. (Wednesbury) Ltd. 8
Santon Ltd. 6
Scemco Ltd. 66
Scholes, Geo. H., & Co. Ltd. ... *Cover* (iii)
Smart & Brown (Engineers) Ltd. ... 6
South Wales Switchgear Ltd. 38
Sperryn & Co. Ltd. 32
Standard Telephones & Cables Ltd. ... 37
Stanhope Box Co. Ltd. 26
Statter, J. G., & Co. Ltd. 66

Taylor, Tunnicliff & Co. Ltd. 61
Thermodare (Great Britain) 18
Transformer & Electrical Co. Ltd. ... 60
Transformers (Watford) Ltd. ... *Cover* (ii)

United Ebonite & Lorival Ltd. ... 53
Universal Boilers & Engineering Co. Ltd. 17

Venner Ltd. 24
V.G. Porcelain Co., Ltd. 49

Ward, Thomas W., Ltd. 35
Westinghouse Brake & Signal Co. Ltd. 10
Wildbore, J. E., Ltd. 62
Woods of Colchester Ltd. 57
Wootton & Co. Ltd. 12

Yorkshire Switchgear & Engineering Co. Ltd. 14

Zenith Electric Co. Ltd. 60

MINERVA

ELECTRICAL INSULATING VARNISHES

STOVING VARNISHES (NATURAL RESIN TYPE)

STOVING VARNISHES (SYNTHETIC RESIN TYPE)

THERMO-SETTING VARNISHES

AIR-DRYING VARNISHES

CLOTH VARNISHES

CORE-PLATE VARNISHES (STOVING AND AIR-DRYING)

COPPER-WIRE ENAMELS (OLEO-RESINOUS AND SYNTHETIC TYPES)

All the above are supplied in black and clear.

ACID AND HEAT RESISTING ENAMELS (AVAILABLE IN ALL COLOURS)

MICA BONDING VARNISHES

COIL STICKING VARNISHES

SLEEVING VARNISHES (BLACK, CLEAR AND COLOURS)

CABLE LACQUERS (NON-FLAM., CELLULOSE TYPE AND P.V.C.)

COMPOUNDS (VARIOUS TYPES)

All the materials listed conform to B.S. Specifications wherever applicable.

***Our Insulating Varnish Department** includes research and testing laboratories; the service of specialists is available to any manufacturer or engineer concerned with problems of insulating materials and their application.*

PINCHIN JOHNSON & CO.

4 CARLTON GARDENS, LONDON, S.W.1. Tel.: TRA 5600

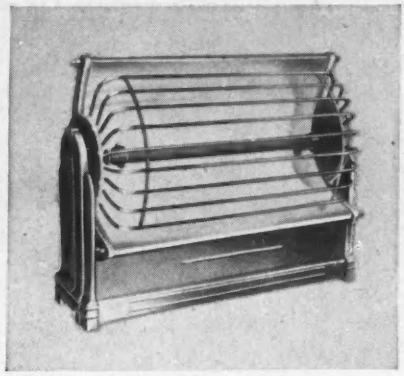
It's **MEM** again for top value in fires and convectors

QUALITY is better than ever in the new season's MEM range. All reflectors are brass, heavily chromium plated. Every fire and convector complies fully with BS 1670. This lays down stringent requirements for insulation, safety clearances, earthing and rust-proofing, thus ensuring complete safety, long life and reliability. You can offer this extra quality in all MEM fires at prices that mean quick, easy sales.

MEM fires are available in a choice of attractive colour finishes.

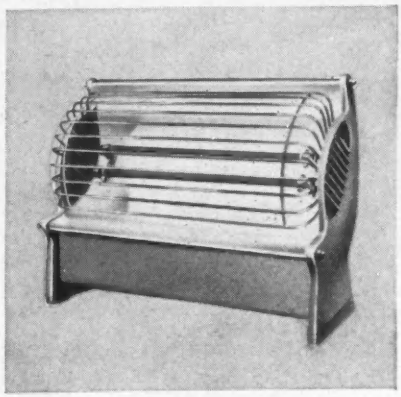
Each fire has a substantial safety guard complying with statutory safety regulations.

Send for new Fire List No. 351.



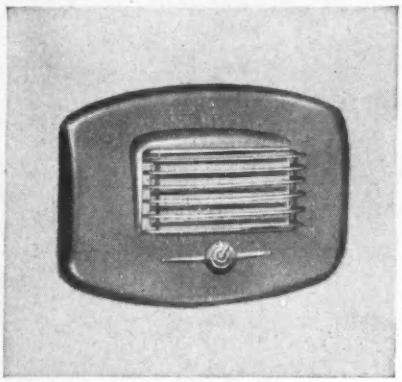
MEMRAY

Fine quality swivel reflector fire. Chromium plated brass reflector, efficient guard, robust cast construction. In 1 and 2 kW ratings.



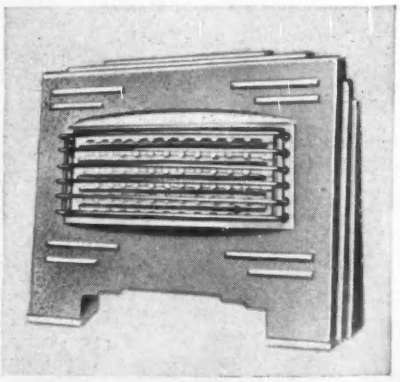
REFLEX

A sturdily built reflector fire offered at an attractive price. Cast iron sides, chromium plated brass reflector. In 1 and 2 kW ratings.



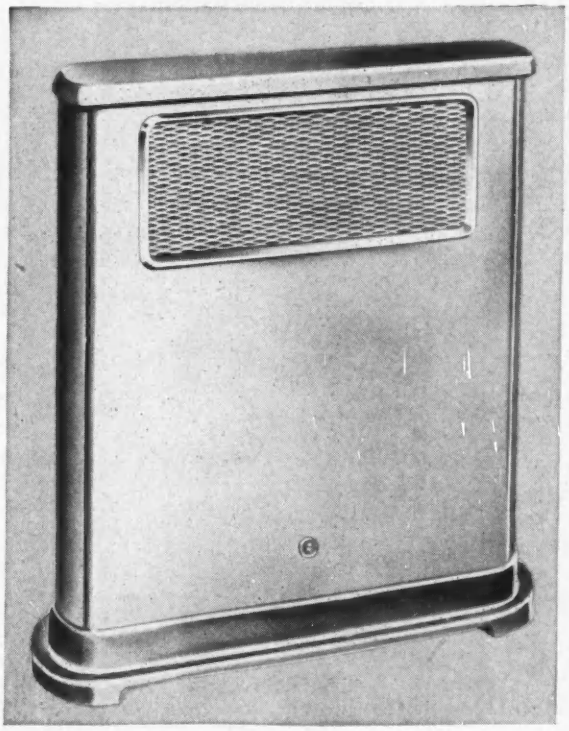
PANEL FIRES

Attractive modern designs. The "Walbeam" Outset Flat Bar Pattern is designed for surface mounting. The "Walray" Inset Reflector Pattern is for recessing into wall or surround.



MAYFAIR

A really well-made bar type fire that will give years of good service. Attractive simple design. Sturdy cast frame. In 1 and 2 kW ratings.

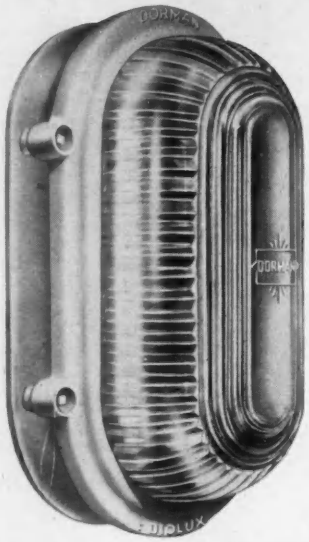


MEMVAIR CONVECTORS. Keep in step with the growing popularity of convectors by giving a prominent place in your showroom to MEMVAIR convectors. Handsome, efficient and absolutely safe. Lovely bronze finish. In three ratings, 1, 1½ and 2 kW with or without thermostat.

MEM

MIDLAND ELECTRIC MANUFACTURING CO. LTD.,
Tyseley, Birmingham 11.
Branches in London and Manchester.

DORMAN PRISMATIC LIGHTING FITTINGS



- *L.33 CORROSION RESISTING SILICON ALUMINIUM ALLOY*
- *HIGHLY EFFICIENT PRISMATIC GLASS*
- *WATERTIGHT . . . DUSTPROOF*

It's **DORMAN**

. . . it's dependable

AS SUPPLIED TO THE ROYAL YACHT "BRITANNIA"

WRITE FOR LEAFLET PSM 10254

DORMAN & SMITH LTD
LIGHTING DIVISION - MANCHESTER 5 - and at
10 EMERALD ST. LONDON W.C.1
249 ST. VINCENT ST. GLASGOW C.2
11 COLLEGE SQ. NORTH BELFAST

GENRISTO

LTD.

OSMASTON STREET, NOTTINGHAM

Boiling Plate

850w—6" diameter
SOLID PLATE
EMBEDDED ELEMENT
Volts—200/10 and
230/50

They're lively lads at Lorival

L34

This Cheese Core Sleeve (for textile winding) requires grooving on the outside and an undercut recess half-way down the bore, yet must be completely free of flash or burrs. A transfer injection moulding held to close limits of tolerance solved both these problems.

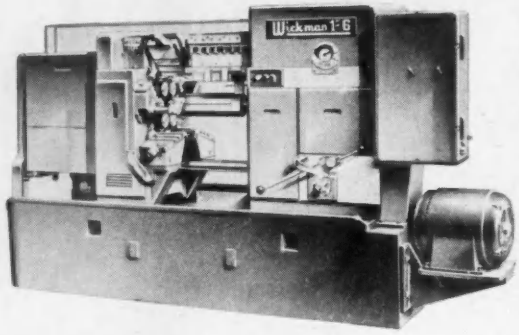
Our proposition, sir, is surprisingly simple. It is this! You can't be a master of every technique. Therefore, where mouldings in plastics are concerned—leave it to Lorival. They're lively lads at Lorival! They'll give you a first-rate service: pleasing design, fine finish, keen prices, and rapid delivery. What more could you want!

LORIVAL PLASTICS

UNITED EBONITE & LORIVAL LTD · LITTLE LEVER · NR. BOLTON · LANCS.

G

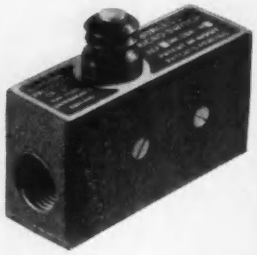
BURGESS
MICRO-SWITCHES
Industry's Automatic Choice



THE NEW WICKMAN 1″ 6-SPINDLE AUTOMATIC . . .

This recent addition to the famous Wickman range of Automatics employs three Burgess Micro-Switches. One energises a solenoid which trips the feed when the feed safety clutch disengages as a result of overload. The other two disengage the bar feed clutch when any spindle runs out of bar stock. All three Micro-Switches are our robust metalclad type, reference MK.3BR-MS, provided with conduit entry.

Burgess Micro-Switches provide the reliable and accurate answer to many automatic switching problems, as Wickman Ltd. have discovered. If you have such a problem, why not consult our engineers? Catalogue No. 50/8 contains details of our standard range.



BURGESS PRODUCTS COMPANY LTD

Micro-Switch Division

DUKES WAY, TEAM VALLEY, GATESHEAD 11

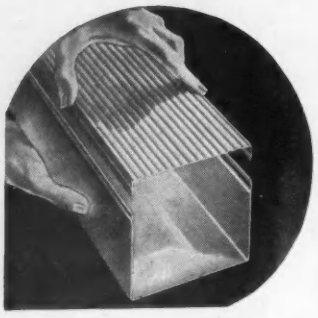
Telephone: Low Fell 75322 (3 lines)

MANY FAMOUS NAMES

Many famous names are included amongst the users of our patented cable trunking.

Babcock & Wilcox Limited.
Central Rediffusion Services Ltd.
Eldorado Ice Cream Company Limited.
Electrical Installations Limited.
English Electric Co. Limited.
Ericsson Telephones Limited.
Glaxo Laboratories Limited.
W. T. Glover & Co. Limited.
Hoover Limited.
Johnson & Phillips Limited.
Lever Brothers, Port Sunlight, Limited.
London Transport Executive.
J. Lyons & Company Limited.
Marconi's Wireless Telegraph Co. Limited.
Metropolitan-Vickers Electrical Co. Ltd.
Mullard Limited.
The Permutit Company Limited.
John Player & Sons
Branch of the Imperial Tobacco Co. (of Great Britain & Ireland) Ltd.
Siemens Brothers & Co. Ltd.
Standard Telephones & Cables Limited.
Stevenage Development Corporation.
Technicolor Ltd.
The Times Publishing Co. Limited.
Troughton & Young Limited.
Vickers-Armstrongs Limited.
W. D. & H. O. Wills.
Branch of the Imperial Tobacco Co. (of Great Britain & Ireland) Ltd.
Wilmot Breeden Limited.

CHANNEL "Spring Capped" CONDUIT



If you would like to know about the many advantages of Channel Conduit please write or 'phone for descriptive pamphlet R.A.14.

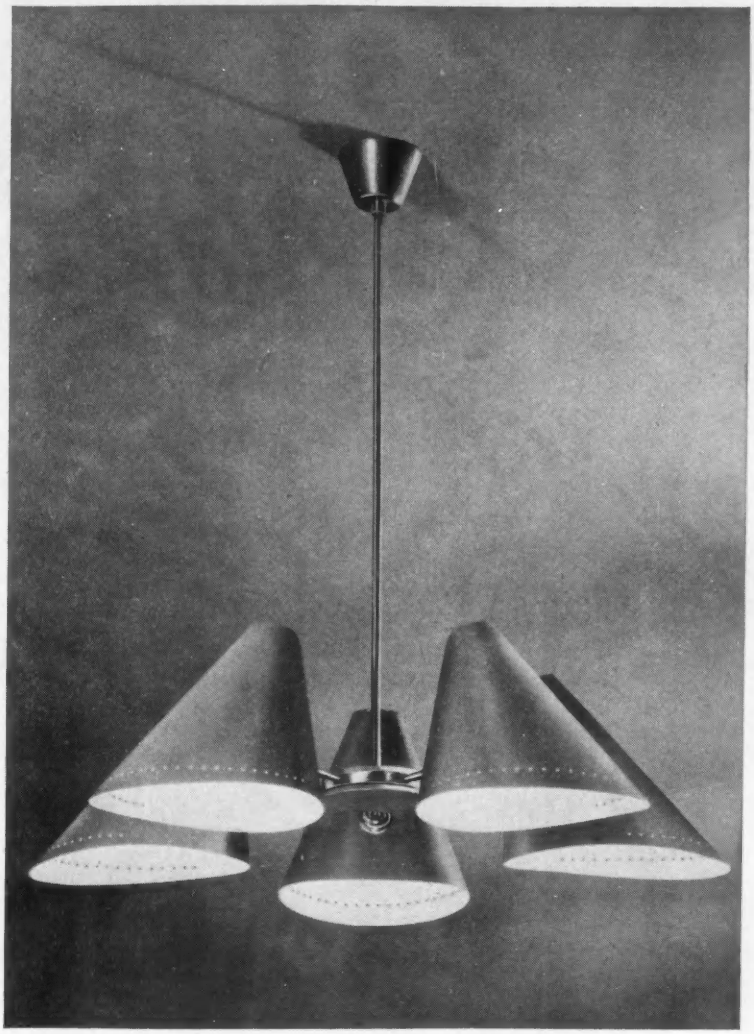
Sizes stocked: 4 × 4, 4 × 3, 3 × 3, 3 × 2, 2 × 2, 2 × 1, 1 × 1, and 1 × ½.

CHANNEL CONDUITS LTD.

11, Victoria Street, London, S.W.1

Tel: ABBey 2027/8

in 'House & Garden' colours



F34041. *Satin brass, with reflectors in gay 'House & Garden' colours; dove grey or mustard. Arranged for five 100 W. Osram lamps. Overall spread 31". Overall length 30".*

F34040. *As above, but arranged for three 100 W. Osram lamps. Overall spread 27". Overall length 30".*

The reflectors are reversible, and may be used for upward or downward lighting.

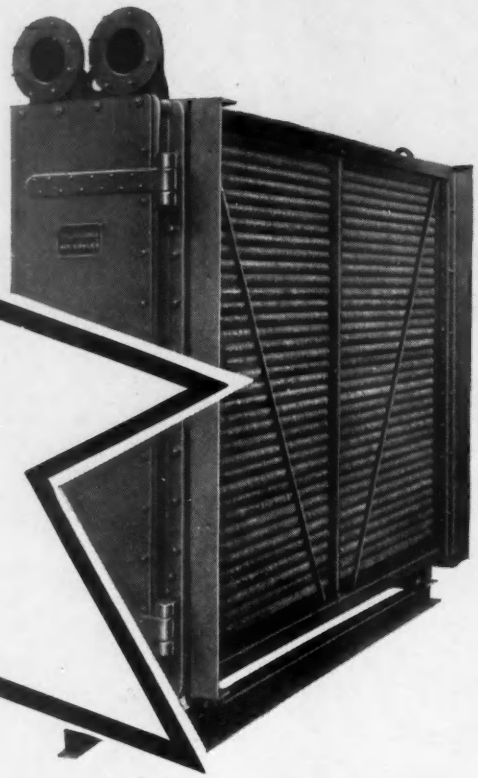
G.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Of tubular construction with no connection to the outside atmosphere, these PREMIER Coolers of advanced design have already been installed in many important power stations, both in Britain and abroad.

PREMIER

CLOSED CIRCUIT AIR AND HYDROGEN COOLERS



THE PREMIER COOLER & ENGINEERING CO., LTD., SHALFORD, near GUILDFORD, SURREY

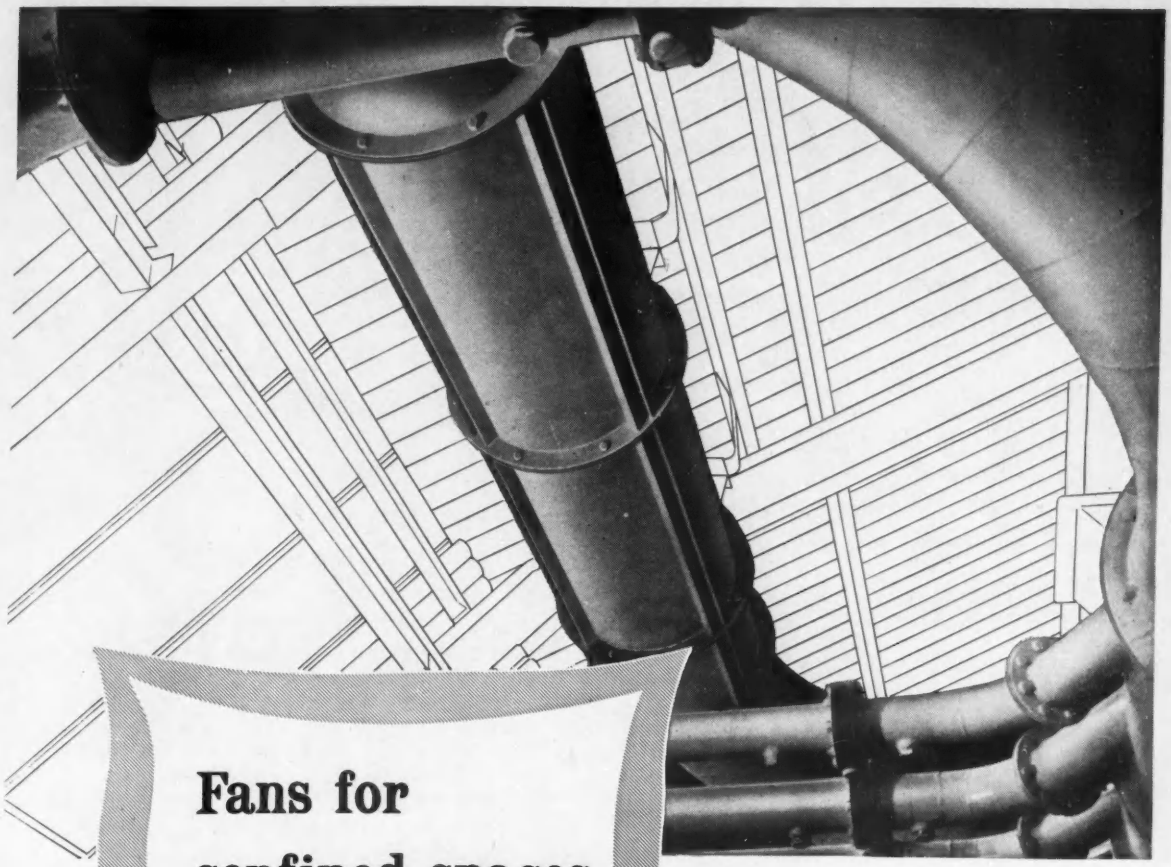
Guessing can be dangerous!

Take no chances-use

ROTUNDA

INSULATING TAPES

ROTUNDA LIMITED DENTON MANCHESTER



Fans for confined spaces

See how little space is occupied by this 5-stage Woods *Aerofoil* fan . . . how compactly it fits into the ducting. A two-stage contra-rotating fan can develop 7″ s.w.g. It is smaller than a comparable centrifugal, simpler to install, requires no bulky bends, no floor space, and consumes less current. High pressures are no longer the prerogative of the centrifugal fan; Woods multi-stage *Aerofoil* fans can develop 20″ s.w.g. or more. Woods fan engineer in your area will be happy to call. Write for publication V1089.

WOODS for Fans

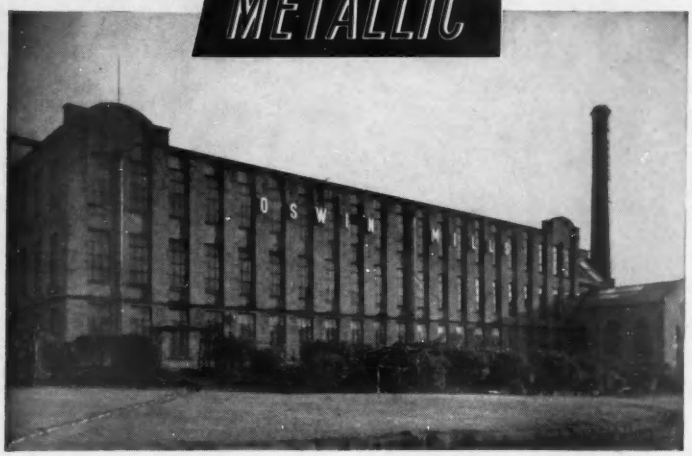
WOODS OF COLCHESTER LIMITED, BRAISWICK WORKS, COLCHESTER.

An associate company of The General Electric Company Ltd.

CONDUIT & FITTINGS SUPPLIED BY

METALLIC

A TI COMPANY



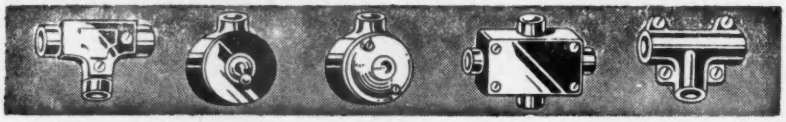
It may be a School, it may be a Factory—a Power Station or a Housing Estate, but more often than not the electrical specification will be—METALLIC.

This Yorkshire Mill is no exception, being fitted throughout with METALLIC Conduit and Fittings—unequalled for quality and consistent accuracy.

Oswin Mills, Frizinghall, Bradford.
Photo, by courtesy of Samuel Rushworth Ltd

Electrical Contractors for this important installation: A. R. Farrar & Co. Ltd.

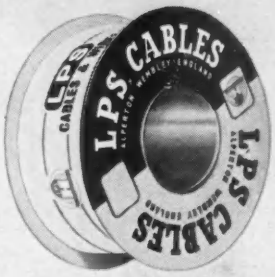
THE METALLIC SEAMLESS TUBE CO. LTD.
LUDGATE HILL · BIRMINGHAM · 3



ALSO AT LONDON · NEWCASTLE-ON-TYNE · LEEDS · SWANSEA & GLASGOW

THE SYMBOL OF QUALITY

CABLES AND



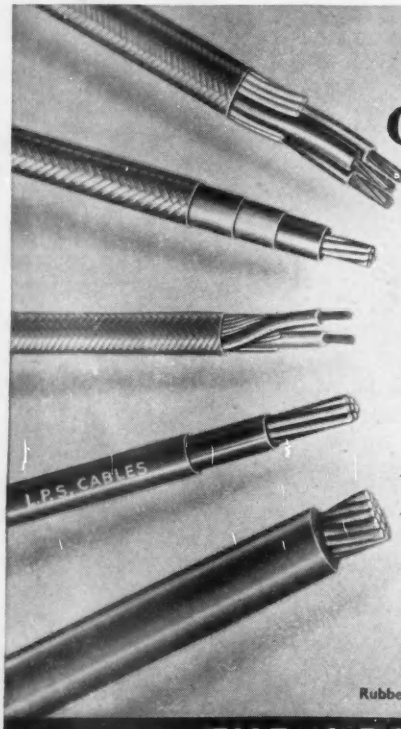
FLEXIBLES

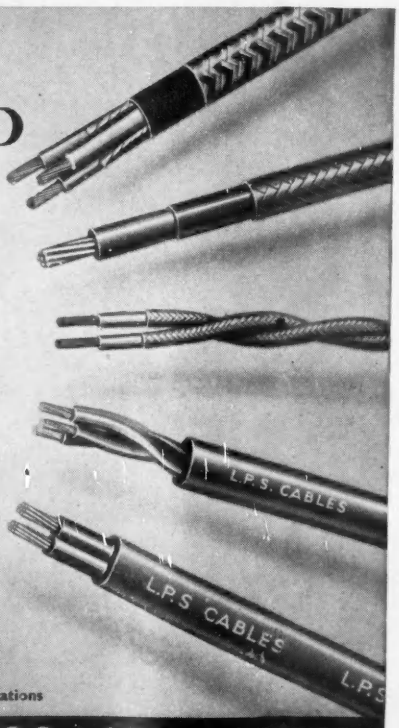
LPS

INSULATED

CABLES AND WIRES

Rubber and P.V.C. Cables to all British Standard Specifications



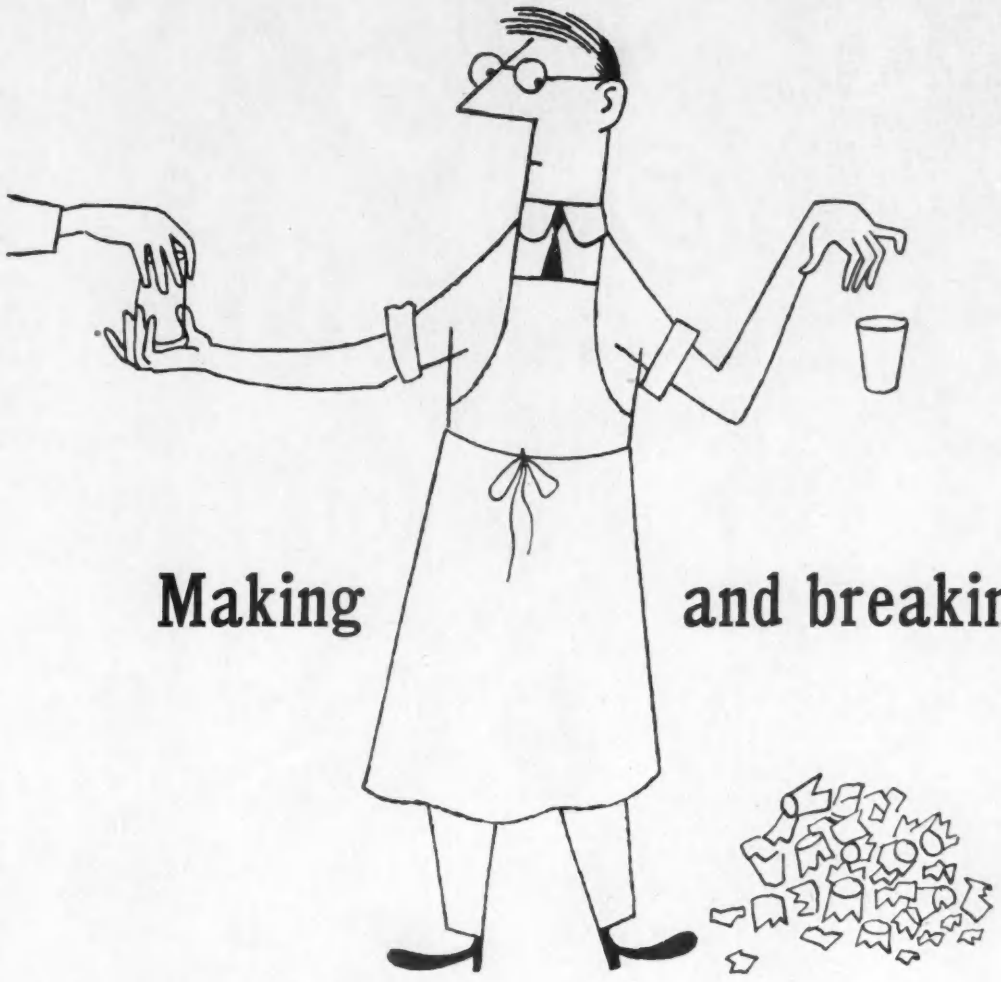


THE L.P.S. ELECTRICAL CO. LTD

ALPERTON · MIDDLESEX · ENGLAND

Telephone: PERivale 5621 (5 lines). 'Grams: Engineyor, Phone, London.

Also Works at Hastings, Sussex, England.



Making and breaking

For wanton destruction, you'd have to go a long way to beat our testing station at Chelmsford. Grimly intent, our laboratory technicians set out to break down switch after switch, bombarding them with an artillery of volts and amps until they go up in smoke.

This is the way we make sure that Crompton Parkinson switchgear will stand up to the jobs for which they are intended. The facilities of this testing station—one of the recognised A.S.T.A. Stations—are also available to, and used by, other manufacturers both home and overseas.

When it comes to SWITCHGEAR . . .

OWNERS OF AN APPROVED ASTA TESTING STATION

you've got to hand it to Crompton Parkinson LIMITED

ELECTRICAL EQUIPMENT

Crompton House, Aldwych, London, W.C.2. Tel : Chancery 3333

ZENITH
(REGD. TRADE-MARK)

Automatic VOLTAGE REGULATORS

with Electronic Control

Essential for many purposes where a constant pre-determined supply voltage is required, these Regulators are designed to give a controlled output voltage within 1% with input voltage variations up to plus or minus 10%. Manufactured for single- and three-phase loads from 5 up to 23 kVA per phase.

Illustrated brochure free on request

THE ZENITH ELECTRIC COMPANY LTD.

ZENITH WORKS, VILLIERS ROAD, WILLESDEN GREEN, LONDON, N.W.2

Telephone: WILlesden 4087-8-9 Telegrams: Voltaohm, Norphone, London

MANUFACTURERS OF ELECTRICAL ENGINEERING PRODUCTS INCLUDING RADIO AND TELEVISION COMPONENTS

WILLIAM ESTD. GEIPEL 1871 LIMITED

Compliance with British Standard Specifications is the

SINE QUA NON

of a good cable. Still higher standards ensuring greater durability are the

AIMS AND ACHIEVEMENTS of

GEIPEL RUBBER INSULATED

Wires, Cables and Flexibles for all Domestic and Industrial power and lighting purposes.

CABLE WORKS, WEMBLEY

Head Office:
VULCAN WORKS, 156-170 BERMONDSEY STREET, LONDON, S.E.1

Industrial Counting Instruments of Merit

RATCHET & REVOLUTION

25342

B & F. CARTER & CO. LTD.
ALBION WORKS
BOLTON 9 ENGLAND

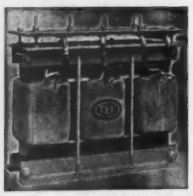
SEND FOR LEAFLET No 187

Telephone: BOLTON 4344 (3 lines)

TEC

POWER & DISTRIBUTION TRANSFORMERS

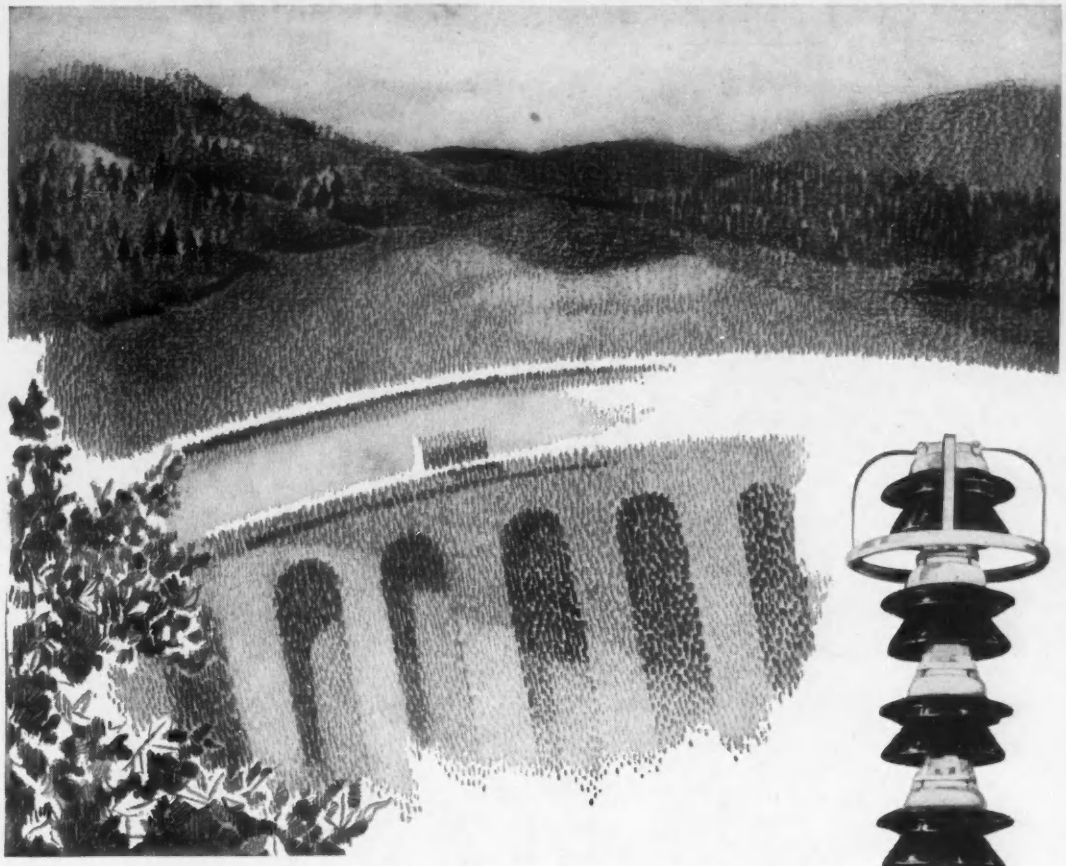
C.S.A. APPROVED

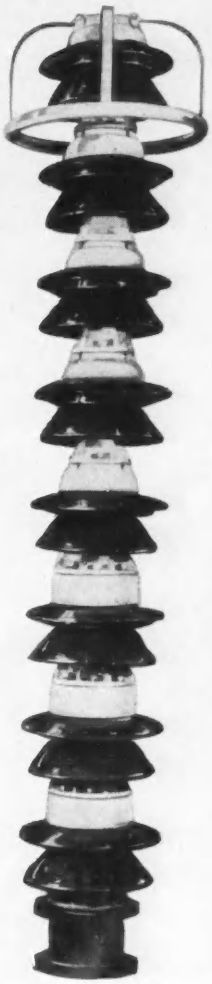


10 VA to 100 KVA Open, Enclosed, Oil Cooled, D.W. and Auto for

INDUSTRIAL ENGINEERING, FURNACES, ELECTRONICS, PHASE CONVERSION, ETC.

THE TRANSFORMER & ELECTRICAL CO. LTD.
EASTERN RD., WALTHAMSTOW, LONDON, E.17
Phone: KEYstone 5031/2





Taylor Tunnicliff

who have a world-wide reputation

for the excellence of

their *Post Insulators*

are now supplying the majority

of Post Insulators for the

British 275 kV. Super Grid

Taylor Tunnicliff first quality porcelains

Taylor, Tunnicliff & Co. Ltd.

Head Office: EASTWOOD · HANLEY · STAFFS.

Telephone: STOKE ON TRENT 5272/4

London Office: 125 HIGH HOLBORN, W.C.1 · TELEPHONE: HOLBORN 1951

There's even more than meets the eye with...

- Vitreous enamel bonded
- Highest mechanical strength
- Maximum electrical performance
- Minimum size in relation to power dissipation
- Can be used in tropical situations without modification
- Wide range of models
- 5 sizes from 25 to 150 watts and 1 ohm to 10,000 ohms
- Available in multi-ganged units with any combination of ohmic values

Ask for List 613A, which gives full technical details and prices.

...BERCO *TOROIDAL RHEOSTATS*

THE BRITISH ELECTRIC RESISTANCE CO. LTD.

Queensway, Ponders End, Middlesex. Telephone: Howard 1492. Telegrams: Vitrohm, Enfield

BERCO

PIONEERS OF THE TOROIDALLY WOUND POWER RHEOSTAT IN ENGLAND

T1231-AH

Plastic Identification Labels

distinctive, durable, in various colours

Engraved or plain, there is a Critchley label for almost every identifying purpose in the electrical industry. Neat and clear in appearance, they are supplied complete with self-tapping screws. Available in a range of colours.

Standard Sizes:

3½″ x 2″	2½″ x 1½″	2″ x 1½″
4″ x 2⅜″	3″ x 1¾″	1½″ x ¾″

SAMPLES AND PRICE LIST ON REQUEST

Critchley Bros. Ltd., Brimscombe, Stroud, Glos.

Telephone: Brimscombe 2208

FIT PROTECTAFIL

BRITAIN'S BEST

SHOCK ABSORBER FOR ALL LIGHTING FITTINGS

LAMP LIFE TREBLED

- *SAVES THE FILAMENT*
- *MAINTAINS LIGHT EFFICIENCY*
- *REDUCES MAINTENANCE COSTS*

The **"PROTECTAFIL"** Shock Absorber damps down both high and low frequency vibrations, thereby protecting the delicate lamp filament from damage. More factories, works and mills are fitting "Protectafil" to all Filament and Fluorescent lighting points. The well-proved saving is many times the initial cost.

NEARLY A QUARTER MILLION NOW IN USE

Approved by British Electricity Board
Australian States Approval Board

Australian Agents:
J. Hibbert Pty Ltd.
477 Kent St., Sydney, N.S.W.
Full details and leaflets from

J.E. WILDBORE Ltd.
6-12 PETER ST. OLDHAM. LANCS

Instruction Chart

For dealing with apparent death from

ELECTRIC SHOCK

based on the

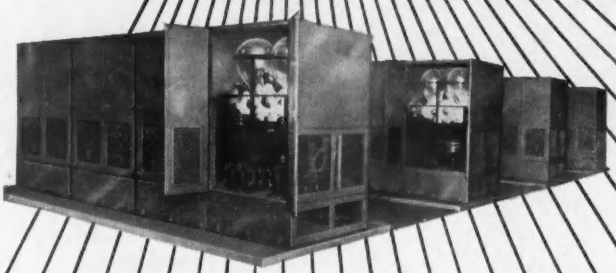
HOLGER-NIELSON METHOD

On card size 19¼″ x 12″ with special high quality finish, eyeletted and corded. Price 2/6 plus postage.

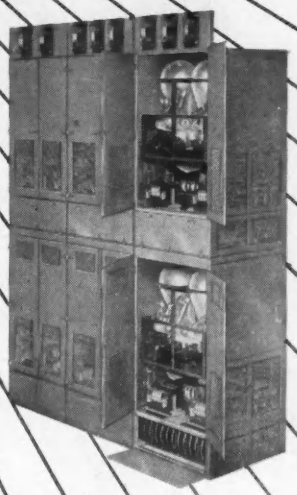
The ELECTRICAL TIMES Ltd

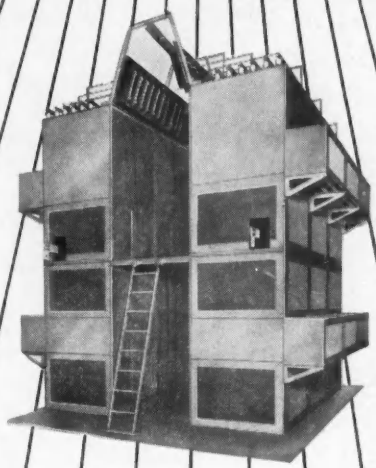
Sardinia House · Sardinia Street · London W.C.2

Made in Britain for service throughout the World...



Hewittic Rectifiers in traction service in Canada (British Columbia Electric Co.). Each bank has a capacity of 1,500 kW. with high overload rating for heavy traction service. The total capacity of Hewittic Rectifiers on this system is approximately 30,000 kW.





Hewittic 1800 kW. rectifier. One of a number, totalling 15,000 kW., supplying the D.F. Sarmiento Argentine National Railway.

Hewittic rectifiers in service in India. One of a large number of equipments totalling over 70,000 kW. for D.C. light and power — output 1700 kW. three wire under tropical conditions.

HEWITTIC rectifiers

over 1¼ Million kW. in World-wide service

HACKBRIDGE AND HEWITTIC ELECTRIC CO., LIMITED
WALTON-ON-THAMES - SURREY - ENGLAND
Telephone : Walton-on-Thames 760 (8 lines) *Telegrams : "Electric, Walton-on-Thames"*

SETTLE for NETTLE

The new NETTLE range of Weatherproof Rubber-clad Couplers, Sockets and Plugs is fully described in a new leaflet now available. A few typical items from this range are shown below. Write today for full details.

Ref. No. CP 31 Watertight Rubber Cable Coupler 2 Amp. 3 Pin.

Ref. No. A 133 Weatherproof 3-way Rubber Socket Adaptor 5 Amp. and 2 Amp.

Ref. No. P 32 and SP 32 Weatherproof Batten Socket and Plug Top Side Entry, 2 Amp. 3 Pin.

★ *Also available, the comprehensive Nettle Catalogue containing details of the full range of* **NETTLE** *Shockproof Electrical Accessories. You are invited to write for a copy.*

NETTLE ACCESSORIES LTD.
HARPER ROAD · WYTHENSHAWE · MANCHESTER

MARTINDALE
PROTECTIVE MASK

Patent Number 479,807
Registered Design Number 819,509

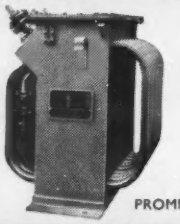
Protect your workers adequately from dust and mist inhalation. Light and comfortable. Fit everybody perfectly. Weight ½ oz. Allow free breathing, clear vision, use of goggles, free speech. The workers will wear them whether watched or not. Reduce absenteeism. Do not cause perspiration or skin irritation. Always clean because pad is easily replaced.

Have given satisfaction for over 25 years and are the standard by which other lightweight masks are judged.

Send 3/3 for Mask and 6 refills (Trial Sample) to

MARTINDALE ELECTRIC CO. LTD.,
45 Westmorland Road, London, N.W.9
also at 25 Elmbank Street, Glasgow, C.2

TRANSFORMERS



FROM 5 V.A.—

SINGLE AND THREE-PHASE, AIR-COOLED, ENCLOSED AND OIL INSULATED TO CUSTOMERS' SPECIFICATION

SUPPLIERS TO: MINISTRY OF WORKS, AIR MINISTRY, BRITISH ELECTRICITY AUTHORITY

A.I.D. APPROVED

PROMPT DELIVERY CAYSON SEND FOR LIST T.54

CAYSON ELECTRICS LTD : WATFORD
London Office: ANGEL HOUSE, LONDON, N.1.
TEL: TERMINUS 0566 TEL: WATFORD 7156 & 7177

Service &

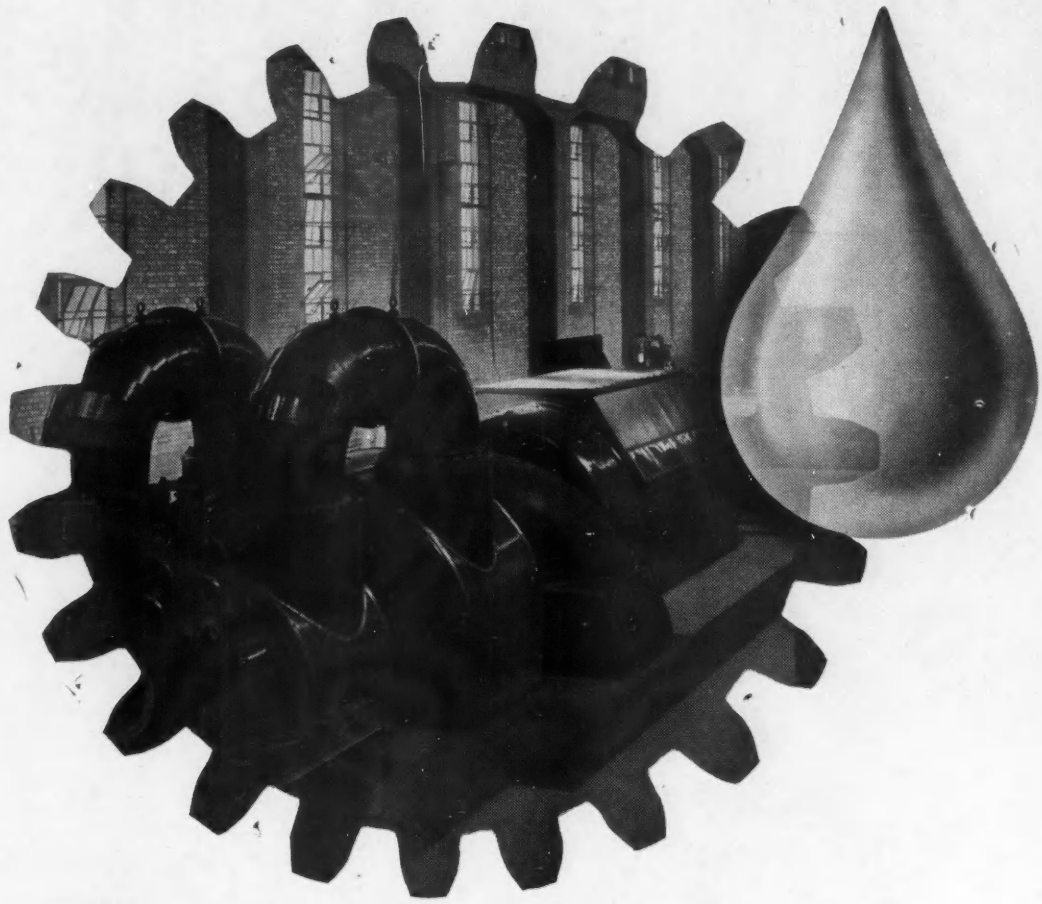
ENTerprise 6222

AUCHTERLONIE

BALL BEARINGS
ROLLER BEARINGS
PLUMMER BLOCKS, etc

Immediate Delivery. Keen Prices. Write for monthly stock list A.1

CHAS. AUCHTERLONIE & CO., LTD.
32 STATION RD., NEW SOUTHGATE, LONDON, N.11



Machinery runs longer and more smoothly on

BP ENERGOL

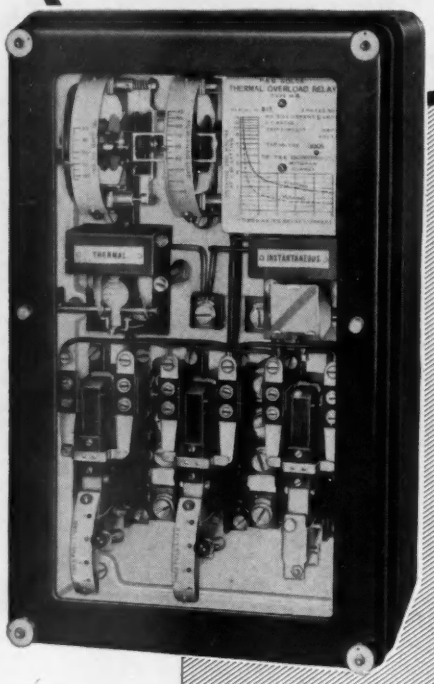
the engineer's oil

Distributors of BP Energol Lubricants in Great Britain for Industrial and Marine purposes

THE POWER PETROLEUM COMPANY LIMITED

Head Office: 76/86 Strand, London, W.C.2.

PROTECT
YOUR MOTORS
with
P & B Golds' Relays



For motors with long starting periods or starting currents under extremes of ambient temperature.

Send for descriptive pamphlet.

THE P&B ENGINEERING CO · LTD
CROMPTON WAY · CRAWLEY · SUSSEX
TELEPHONE: CRAWLEY 1004

IT'S NEW!

It's SCEMCO

PLASTIC LOUVERING

No limit to louvering areas, and delivered in easily assembled sections. It can be cut to any shape.

Beautifies and attracts with its modern concealed lighting effect.

- *Light, rigid, attractive*
- *Does not tarnish*
- *Easy to fix*
- *Competitive in price*

No limit to size available
—for use with Scemco fittings

Send us the measurements
—we do the rest.....

SCEMCO LIMITED
ENGLAND'S LEADING FLUORESCENT LIGHTING SPECIALISTS.
SOHO STREET · LONDON W1 · *Tel.*: GER 1461-2-3

MERITUS

INDUSTRIAL LIGHTING BRACKETS

Robust Construction both Electrically and Mechanically for
WORK BENCHES, LABORATORIES
MACHINE LIGHTS, GARAGES, ETC.

Use in conjunction with Meritus Low Voltage Transformers

MERITUS (BARNET) LTD. BARNET, HERTS Tel.: Barnet 2291/2

SWITCHGEAR SPECIALISTS

STATTER

J. G. Statter & Co. Ltd., 82 Victoria St. S.W.1

MANCHESTER ROYAL EXCHANGE - *Photograph by permission of Manchester Evening News*

Architects
Messrs. BRADSHAW, GASS AND HOPE
BOLTON

Electrical Contractors
E. M. EVANS & CO. LTD.
MANCHESTER

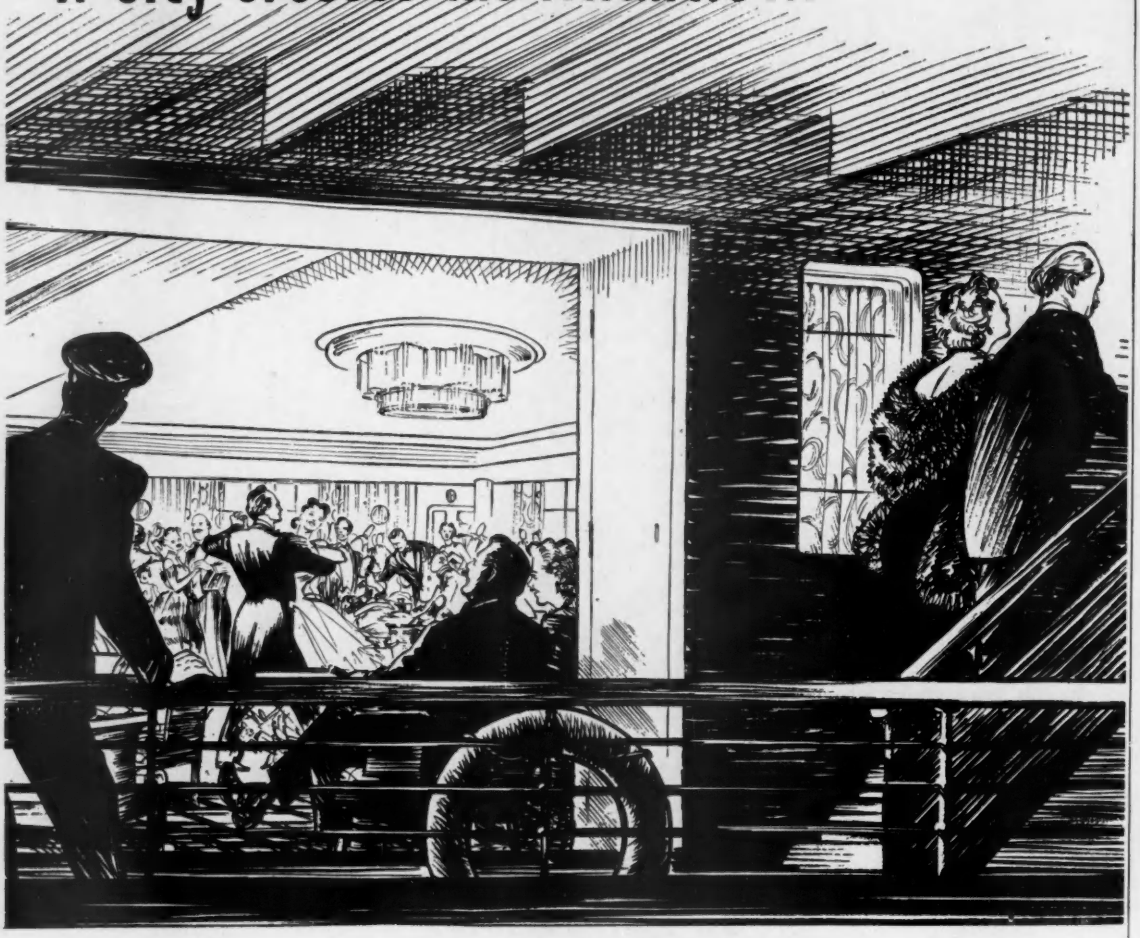
Within the last 40 years, The Manchester Royal Exchange has carried out major building works. Between 1914 and 1921 extensions were made to the Third Exchange, which was erected in 1874. On the night of December 22nd, 1940, the Exchange was one of the many buildings severely damaged through enemy air attack, and in June 1947 work commenced on reconstruction of this important building.

On November 17th, 1953, on the completion of the work, Her Royal Highness The Princess Margaret graciously performed the re-opening ceremony.

Glovers, who were established in 1868, supplied the Rubber and Paper Insulated Cables for the electrical power installations. We are proud to have been associated in the reconstruction of this imposing building.

W. T. GLOVER & CO. LTD.
MEMBERS OF THE C·M·A
TRAFFORD PARK MANCHESTER 17
TRAFFORD PARK 2141
BY APPOINTMENT

A city crosses the Atlantic...



The transatlantic liner employs all the resources of the electric age to make sea travel safer, more comfortable, speedier. Electric cables (over 1,000 miles of them in R.M.S. Queen Elizabeth) are the ship's arteries . . . cables developed by members of the Cable Makers Association.

By close technical collaboration among its members, the C.M.A. has pioneered the most important developments in electric cable making. That same collaboration makes possible the exceptionally high standards for all types of C.M.A. cable—and safeguards every user.

SPECIFY C·M·A CABLES

The 'Roman Warrior' and letters 'C.M.A.' are British Registered Certification Trade Marks

CABLE MAKERS ASSOCIATION, 52/54 HIGH HOLBORN, LONDON, W.C.I

Printed in England by Staples Printers Limited at their Great Titchfield Street, London, establishment, for the Proprietors, The Electrical Times Ltd., and published at Sardinia House, Sardinia Street, London, W.C.2.

WYLEX

1-WAY

2-WAY

3-WAY

4-WAY

6-WAY

8-WAY

REWIRABLE or CARTRIDGE FUSES 5, 15, 30 AMP

Wylex FUSE UNIT

ALL-INSULATED · METALCLAD

Makes a Good Installation Better

Write for Catalogue to:

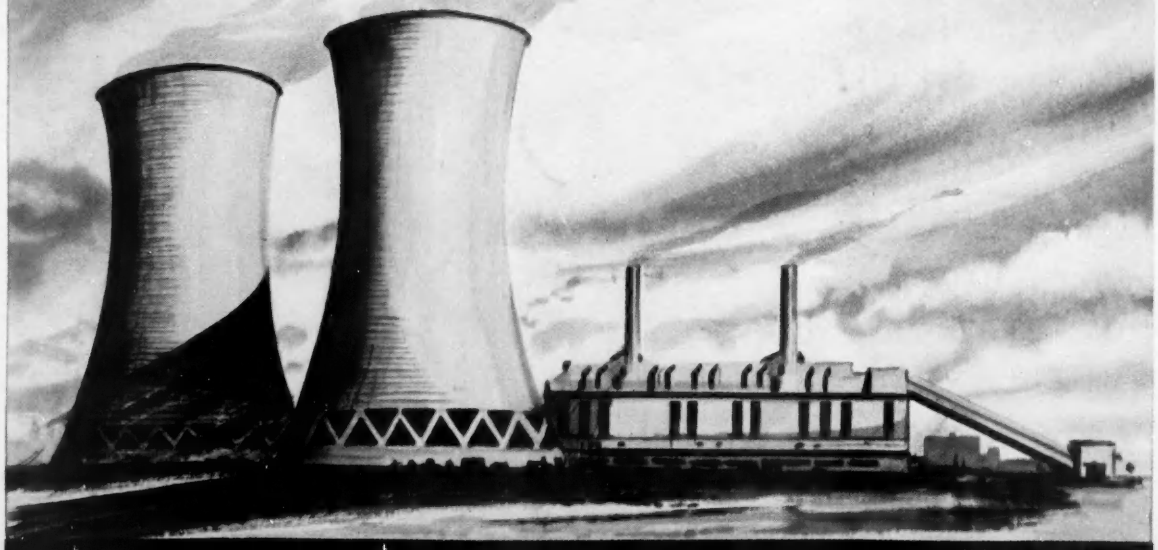
GEORGE H. SCHOLES & CO LTD · Wylex Works · Wythenshawe · Manchester

CONDENSING PLANT
AND AUXILIARIES

FEED HEATERS · DEAERATORS · EVAPORATORS · SELF-CLEANING WATER STRAINERS

FOR

POWER
STATIONS



HICK HARGREAVES
AND COMPANY LIMITED · BOLTON